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TRANSCENDING BOUNDARIES

Environmental histories from the
Øresund region



Fredrik Björk, Per Eliasson &
Bo Poulsen (eds.)



MALMÖ HÖGSKOLA

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TRANSCENDING BOUNDARIES

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Transcending boundaries



THE ÖRESUND REGION

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INTRODUCTION

Local livelihoods and global challenges. Understanding human interaction with the environment

Fredrik Björk, Per Eliasson & Bo Poulsen

The first World Congress of Environmental History aims to explore human interaction between people and their environment on many different scales. Our baselines for research become challenged thematically, spatially and in time, also when visiting regions far away from home – or just across the Öresund. The Öresund is the name of the narrow waters between Copenhagen, Denmark and Malmö, Sweden.

Carved out by the ice melting away at the last ice age, the Öresund area and hinterland was soon an environment of bounty, probably exploited by humans as early as 12,000 years ago. While remains of the early cultures are scarce, the last millennium has witnessed a broad range of well-documented encounters between man and nature in this part of the World.

This booklet intends to present some examples of the local livelihood and interactions in the two countries that are hosting the congress, as well as their connection to global developments. By doing so we discover how patterns resemble each other but also how they differs between countries and continents, and we hope to contribute to the understanding of a region where two nation states are bridging, mentally and through modern engineering, the challenges of a deeply rooted common history situated in a shared environment.

This common environment consists of two parts – firstly the fertile soils in Zealand and southern Scania with good preconditions for agriculture, secondly the Öresund with rich fish catches and above all its

function as a maritime crossroad between Western and Eastern Europe but also between Zealand and Scania. These two major preconditions of human interaction in the region are highlighted in every chapter, along with common threads of issues of subsistence, energy and consequences of population growth.



Similarities and differences between the Danish and Swedish sides are in focus in Stefan Anderbergs article on *Industrialization and environmental development around the Øresund*. With a perspective stretching from the early stages of industrialization in the mid-1800s to the increasingly integrated economies of today, Anderberg looks at how pollution have changed over time, drawing conclusions that the development is in many ways similar to the experiences in other Northern and Central European countries. Important differences between the Swedish and Danish sides of the Øresund are visible in the development of the energy system and in food and agricultural policies.

A long-term perspective is provided by Carsten Jahnke, looking at the herring fisheries in the Øresund from 1200 to 1600. In *The European fishmonger*, Jahnke shows how the “fish without bones” became a new export commodity and contributed to the development of the Scanian markets. The ecological conditions permitted a constant catch of large quantities of herring, but there was also a more or less mythical awareness of overfishing. The Scanian markets were important transfer points of the medieval European trade, since they connected western and eastern market systems. In the fifteenth century, the Scanian markets began to decline and eventually ceased. The traditional explanation for this relates to depleted herring stocks, but Jahnke also points to newer research, which suggests that political and economical processes in Europe must be taken into consideration.

Fishing is also in focus in Johan A. Lundin’s article *Fishing in the Øresund and the Janus face of industrialism*. Lundin investigates material from the Scanian fishing villages Limhamn and Råå, the largest in southern Sweden at the turn of the twentieth century. The development of equipment and boats made the fishermen less dependent on weather and local conditions, but was also a target for criticism. Industrialization was an important part in the development of modern fishery, Lundin concludes, but could also have negative consequences, such as overfishing and pollution.

The industrialization of food production systems is also the topic in *The future is a sweet dream. Sugar production and environmental impact c. 1850-1950*. Here, Fredrik Björk examines how sugar beets were introduced in Scania and became a significant agent in the integration between agricultural and industrial systems. The beet sugar factories were some of the most criticized polluters of the late nineteenth century, responsible for dried-up lakes and rivers, dead fish and foul smells. At the same time, sugar was perceived as luxurious and modern, and supported by important political and financial interests.

In his article, *Environmental agency*, Bo Fritzboøger has an even longer time frame discussing examples of how forests have been used and perceived in Denmark from c.1500 until today. Taking his starting point in the historical interdependence between humans and the physical environment in the early modern multifunctional land use and discords over concepts such as underwood and overwood. The wood itself became an actor when the tenants preferred to use the underwood as coppices. This practice stops the maturation of the overwood, i.e. big trees of beech or oak, while instead a transformation of woods into underwood becomes apparent. With several examples like this Fritzboøger shows how, until today, the woods can be seen as actors in an interaction with human society.

The woodlands of Scania, on the Swedish side of the Öresund, resemble those in Zealand in Denmark. For centuries the city of Malmö had the same problems with scarcity of wood as many Danish cities. This in turn makes Malmö different from many other Swedish cities. In his article *When the ceiling was broken*, Per Eliasson explains how natural conditions made the pre-industrial city of Malmö suffer more from energy poverty than most Swedish cities. The arrival of British coal from the mid-1800s changed this situation dramatically. When this dependence on the local natural conditions for energy use was removed, the use of first coal and then oil and electricity created the modern city of Malmö.

Industrialization in the Öresund region was closely linked to the introduction of fossil fuels, as Per Eliasson argues in his article. One of the consequences of this was that thick, black smoke filled the skies of the cities. In *Coal smoke pollution in industrial Malmö and Copenhagen*, Lars Berggren shows that there was a sharp increase in the amount of steam power used in Malmö's factories in the late 1880s. Eventually, complaints about coal smoke were made and investigations were started. However, Berggren suggests that the image of black smoke

coming out of a factory chimney was ambiguous, since it was seen as a sign of wealth and prosperity.

Pernilla Ouis' and Ebba Lisberg Jensen's article on cultural and biological diversity in present-day Malmö, "*I brought a hazelnut from Macedonia*", investigates how this complex relationship manifests itself in the allotment gardens of Malmö. Ouis and Lisberg Jensen also examine the debate on biodiversity in the Swedish context, where they argue that two distinct positions can be identified: either biodiversity is related to *variety* - of individuals, species and populations, or to *indigenous nature*.



The articles mirror the research work in environmental history at the Universities of Roskilde, Copenhagen, Malmö and Lund and the network that links it together. Since our Nordic Environmental History conference in 2004 in Copenhagen and Malmö this cooperation has been ever closer. Forest history, history of energy transitions, marine environmental history, consumption, migration and the processes and consequences of industrialisation have been key elements in this research. In this work the regional perspective is important as even the concept of a region changes over time with new technologies and the supply of energy.

It is our hope that these articles will give a presentation of some globally important questions that concerns us all and their regional development over time in our own local livelihood – the Öresund Region.

INDUSTRIALIZATION AND ENVIRONMENTAL DEVELOPMENT AROUND THE ØRESUND

A long-term perspective on the regional development

Stefan Anderberg

INTRODUCTION

During the last 15 years, the Øresund region has become one of the most dynamic city regions in Europe. Economic revitalization characterized by expansion of the private service sector and increasing regional integration have contributed to this development. This region is characterized today by several current trends among major city regions in the world. It has been strongly influenced by the trends of “ecological modernization”¹ and green “branding”.² Since the early 1990s, environmental efforts are no longer viewed as only important for health and environment, but also for stimulating regional economic growth and attractiveness. The Environmental Programme for the Øresund Region³ states that:

A good environment [...] is also one of the most important preconditions for a positive and dynamic development. With this environmental programme it is our intention not only to take a first step towards breaking the relation between wealth and negative environmental impact, but to establish that a good environment is a prerequisite for desirable development in the Øresund region.

Sustainable development efforts signal that this is an advanced region and encourage environmental innovations that may result in exports of products and services! Particularly Copenhagen and Malmö have been successful in their efforts to develop their profiles as innovative eco-city forerunners, and they often achieve high rankings in international comparisons.⁴ The aspirations of Copenhagen to become the environmental capital of Europe were already rendered some legitimacy with the location of European Environmental Agency in the city in 1994. According to the present vision, by 2015 Copenhagen will be an important environmental centre in the world and the city will have shown that environmental care gives development dynamism. Malmö does not have such grandiose visions, but in recent years has received attention all over the world for its sustainable city-inspired urban renewal projects.

The history of environmental degradation and industrial pollution in the region, and the dramatic pollution trend-break and clean-up in recent decades are very important assets for the green branding of the Øresund region. Not long ago, the major cities had a long-standing reputation as polluted and unhealthy, and the effects of the intensive agriculture, urban sprawl and traffic growth in the region seemed overwhelming. This article focuses on the long-term industrial and environmental development of the Øresund region with particular emphasis on structural changes in employment, settlement, pollution and resource flows. Comparisons are made between the two parts of the region, and the Øresund region is also to some extent put in relation to other parts of the two countries as well as other parts of Europe. This contribution is based on earlier studies in the region that have particularly addressed the long-term development of resource flows and recent sustainable development efforts.⁵

TWO AREAS IN DIFFERENT COUNTRIES

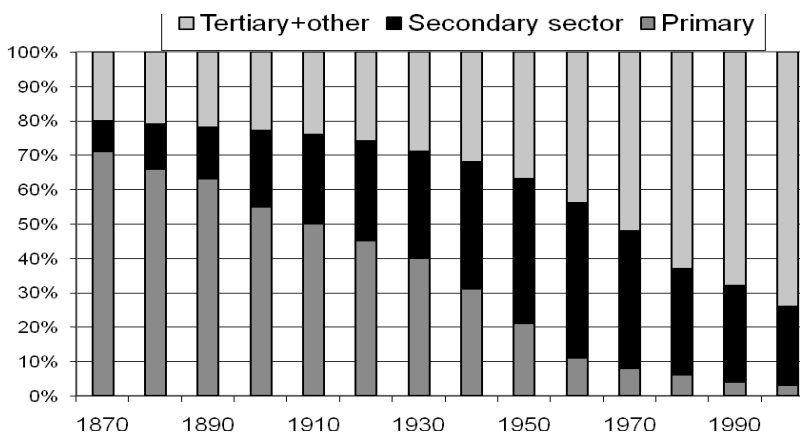
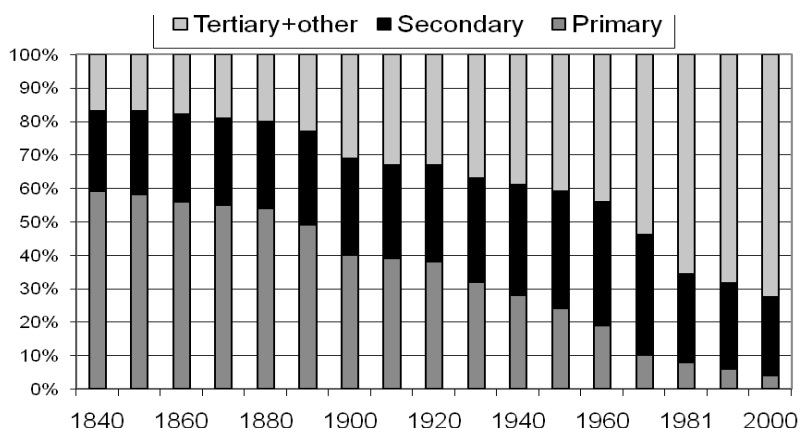
The impressive recent growth of cross-border exchanges such as the number of Sound crossings, migration, and commuting, has taken place from very low levels of interaction, and essentially the Øresund region still consists of two distinct parts. The Danish part is dominated

by the island of Zealand (Sjælland) with Greater Copenhagen, but also includes the other islands in eastern Denmark (Lolland, Falster, Bornholm and Møn) and has 45% of the Danish population. The Swedish part includes the province of Scania (Skåne), which has 13% of the population in the country.⁶ There are many similarities between these two parts of the region, most significantly in terms of nature and landscape and agricultural conditions, but there are also some parallel historical and industrial developments. A fundamental difference is, however, that while Scania is a peripheral region in Sweden, Copenhagen is the national capital, and in many areas the most important city in Scandinavia. The economy in the Danish metropolitan area has always been more diversified, and recent developments in finance, industrial services, research, and tourism, which characterize the region, are much stronger in Denmark. The growth in Greater Copenhagen, which in 2008 even had the highest salary level in the world,⁷ has fuelled Øresund integration by providing jobs for thousands of Swedes.

The difference between the two sides of Øresund was perhaps at a maximum on the verge of the century of the industrial revolution. Denmark was a wealthier, and more economically diversified and urbanized country. More than a fifth of the Danish population lived in the towns and cities in 1800, and more than half of the urban residents lived in Copenhagen, which already had more than 100,000 inhabitants. The city was the capital of an empire that still consisted of Norway, Iceland and Greenland, and some small overseas territories in the West Indies and Africa. Denmark does not have important mineral or energy resources, but has through most of its history been a rich agricultural country producing a surplus for export. As a consequence of demand from military and shipping as well as mercantilist policies, there existed important manufactures in Copenhagen and the surrounding region (e.g. Frederiksværk, Lyngby, and Hellebæk) that produced textiles and garments, metals and armament, chemicals and paint.⁵ Rivers with modest fall heights had long been important locations for various types of mills.

Scania had been conquered by Sweden in 1658. The province had been a central and prosperous part of the Denmark, but had difficulties in finding its role under Swedish rule. Traditional trade links were broken, traditional industries such as iron forging in northern Scania disappeared, and the major cities were degraded to garrisons and local market towns. In the year 1800, only 8% of the Scanian population lived in the cities, compared to 34% in the Danish part of the Øresund

region. Malmö was still the largest city, but had less than 4000 inhabitants. In the first half of the nineteenth century, Scania had relatively many and varied mills and handicraft activities in comparison with other parts of Sweden, but only few large industries.⁹ The most important industrial locations were Andrarum in the southeast with alum works, Höganäs in the northwest with expanding coal mining and glass and ceramics industry, Klippan with its paper mill, and Malmö with manufactures (tobacco, leather, textiles and sugar).

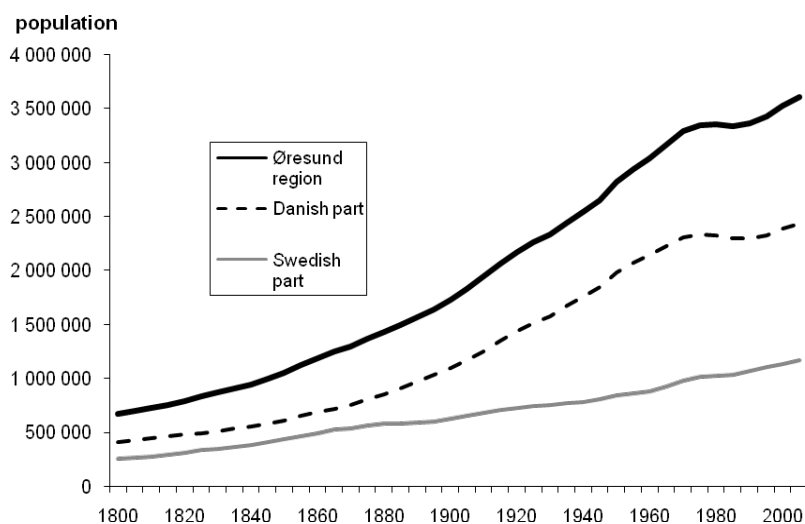


1. Sector employment in Denmark 1840–2005 (top) and in Sweden 1870–2005 (bottom)

The industrial breakthrough in the second half of the nineteenth century was much more dramatic in Sweden than in Denmark, where the shares of secondary sector (manufacturing and construction) employment (Figure 1) and urban population were already above 20%. In 1870, the secondary sector only employed 9%¹⁰ of the Swedish workforce. Before the end of the century, there was a fivefold increase of both industrial production value and employment. During the twentieth century, employment in the secondary sector reached higher levels in Sweden than in Denmark: in 1960 it was 45% and 37%, respectively. At the dawn of the industrial era, Scania had the best agricultural conditions in the country, reserves of clay, lime and coal, but limited resources of other minerals, forest and water power that were so important in the export-driven industrialization in other parts of Sweden. While the industrialization of Scania differed in several ways from the rest of the country, it had similarities to the development in Denmark. The industrial development process can be divided into three phases: the agricultural and industrial revolution in the nineteenth century, the “golden age” of manufacturing and modernization in the twentieth century and the industrial crisis and economic transformation towards the end of the 20th century.

AGRICULTURAL AND INDUSTRIAL REVOLUTION

The dynamic nineteenth century in the Øresund region was shaped by accelerating population growth, agricultural development, and industrialization. Population growth and urbanization provided expanding demand for agricultural products. The population in the Øresund region increased during the nineteenth century from less than 700,000 to 1.7 million people (Figure 2). The population increase was more important in the Danish part. Towards the end of the century Denmark and particularly Copenhagen became a magnet for immigrants who to a large extent came from southwestern Scania.¹¹



2. Population development in the Øresund region 1800–2005

Land consolidation reforms (as well as the abolition of serfdom in Denmark) implemented in Denmark and southern Sweden around the turn of the century 1800 were important for creating independent farmers and for providing opportunities for these farmers to introduce new technology, land reclamation and drainage and new crop varieties for increasing production. The opening of the British market for the grain trade in the 1840s provided opportunities for increasing exports. Sweden, which had never been an important exporter of agricultural products, became a major supplier of oats for the horses of London,¹² and both Swedish and Danish agriculture experienced a boom for three decades until the grain crisis in the 1880s.

The first phase of industrialization in the Øresund region was closely linked to agriculture. The construction of railways from the mid-nineteenth century provided improved access to markets, and the food industry – e.g. mills, dairies and breweries – developed in the new station towns.¹³ Profits from agriculture, the food industry and trade in agricultural products were invested in other emerging industries, such as brick, stone, lime and cement industry in rural areas as well as in new factories in the cities. Furthermore, agriculture was an important customer for the new industries, particularly for the metal and machinery industry and the chemical industry that began production of artificial fertilizers towards the end of the century.

Rural industry was long important in the region. Even before the industrial breakthrough, Scania was together with Stockholm the most industrialized region in Sweden. In 1870, approximately a third of all rural industrial workers in Sweden lived in Scania. In Denmark, most factories were in the countryside until the early twentieth century but these rural factories were mostly small and in 1901 employed only about 35% of the industrial workers. In Scania, the most important rural industrial branches were distilleries, sugar, brick and cement factories. In the year 1900, rural industry employed 45% of the industrial workforce and contributed 35% of the industrial production value.

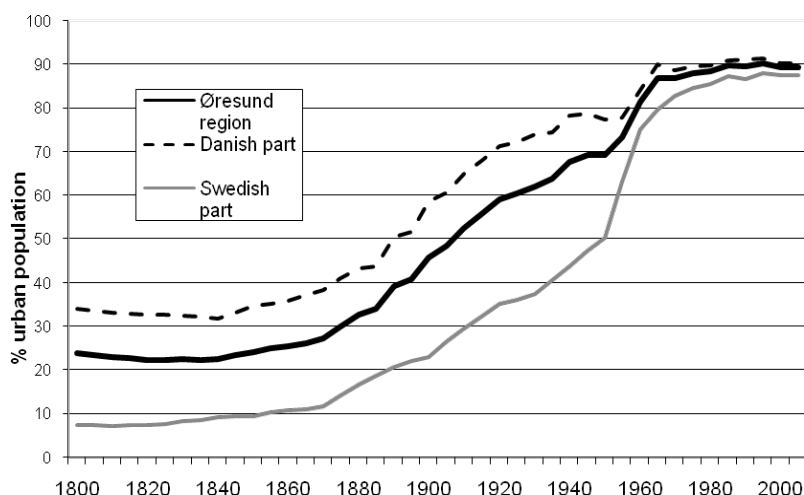
In the late nineteenth century, industrial growth increasingly took place in the cities, and a varied industry developed in most cities in the region. Urbanization accelerated in Scania and the share of the urban population doubled between 1870 and 1900 from 11 to 22% (Figure 3). Around the year 1900, Malmöhus County (southwestern Scania) was the most important industrial county among the 25 counties in Sweden, with an even higher industrial production value per capita than the city of Stockholm, and the industry in the two counties in Scania was almost as important as the industry in all the four counties of the capital region. Malmö with 26% of the industrial workers in Scania had become one of the leading industrial cities in the country, and among the ten most important industrial cities in Sweden five were in Scania (Malmö, Helsingborg, Landskrona, Kristianstad and Ystad).¹⁴ Copenhagen dominated Danish industry with 28% of the industrial workforce in the country. The food industry was still the dominant industrial sector in the region, but in Copenhagen and Malmö, the textile and metal industry had become important.

THE GOLDEN AGE OF MANUFACTURING

In the twentieth century, the cities continued to dominate industrial growth, and rural industry gradually lost its importance in the region. Copenhagen strengthened its position as the dominant industrial location in Denmark. In 1949, 37% of manufacturing employment in the country was located in the central parts of today's Greater Copenhagen.¹⁵ Scania kept its position as the most diversified industrial region in

Sweden, but the national importance of the region diminished as other regions industrialized with a dynamic development of export-oriented sectors such as wood, pulp and paper, and metal. Malmö and Helsingborg strengthened their positions as industrial centres, but many other locations were important as well. Many towns in Scania have given names to long-lived companies in varied branches such as Trelleborg (rubber and chemicals), Höganäs (metals), Perstorp (chemicals), and Ballingslöv (kitchens).

The industrial growth in the cities contributed to continuous urbanization in the region (Figure 3). On the Danish side, almost four fifths of the population lived in urban areas before the Second War, while it was not until the 1960s that similar levels were reached in Sweden. Between 1900 and 1950, the urban population in the Øresund region increased from 800,000 to almost 2 million. Most of this urban growth took place in Greater Copenhagen and in the Swedish cities along the Sound (Malmö, Helsingborg and Landskrona). From the early eighteenth century until the 1970s, Malmö consistently was among the fastest-growing cities in Sweden.



3. Urbanization in the Øresund region 1800–2005

Food production was still a major industrial sector in the Øresund region, but the mechanical industry in the twentieth century became much more important. In the inter-war period, shipbuilding became a new successful export-oriented regional specialization, and after the

Second World War shipyards were the most important employers in Copenhagen, Malmö, Landskrona and Helsingør. The textile industry was also as important as the food industry until the 1960s.

On both sides of Øresund, food exports had played a central role in the industrialization process, and the two parts of the region seemed for a long time to have equal potential for further development of the export-oriented food industry. However, radically different national responses to the international agricultural trade crisis in the late nineteenth century created two separate paths of development. Danish food production successfully specialized in animal products, while Sweden reintroduced customs barriers to protect agriculture, and the Scanian food sector was for more than a century almost solely producing the domestic market. Denmark has continuously developed its position as one of the world's leading exporters of pork, dairy products and beer, and agricultural exports long dominated national exports during the twentieth century. In 1960, meat and dairy products alone made up almost half of the national exports, but the industrial employment share of the food industry was only 12%. The metal and engineering industry, with more than 40% of the secondary employment, contributed only 20% of the exports. The regional specialization in agriculture and food was of great importance for parts of the mechanical industry producing tools and machinery for agriculture as well as for the development of regional specialization in packaging (Hartmann, Tetra Pak), chemical production of agricultural inputs and several other industries.

INDUSTRIAL CRISIS AND ECONOMIC TRANSFORMATION

The post-war period was characterized by the fastest economic and industrial growth in Scandinavian history and the development of a car-driven welfare society. However, in the 1970s, several major industries were severely hit by the recession after the oil crisis, and the economy and population in the whole region stagnated. Formerly important industries such as the textile industry disappeared and the large shipyards began a decline, regional policies disfavoured the big cities, and new industrial development took place elsewhere in the countries. For Scania, this was also a period of sharp decline: from one of wealthiest regions in the country in the 1960s to one of poorest in the 1990s.

However, since the end of the 1980s, Copenhagen and Malmö have experienced renewed growth due to dynamic development of an internationally competitive service industry, research and education, and the population and economy of the whole has grown. Among new economic specializations is a concentration on biotech education, research and development, making Øresund region one of the leading bio-tech regions worldwide.¹⁶ Compared with the 1960s, the employment structure has changed considerably. By 2005, the secondary sector employed only 19%, while the employment share of private services was 41%, of which more than a quarter are employed in the fast-growing business services.¹⁷ In the last fifteen years, the decreasing importance of secondary employment has been more due to the growth of total employment in the region than to a general fall in the number of industrial jobs. The chemical industry has even expanded in the region, while the traditionally important food and metal sectors have decreased.

ENVIRONMENTAL CRISES AND CLEAN-UP

Urban crises

Industrialization and urbanization caused long increasing environmental pressures in the region. Olof Wärneryd et al.¹⁸ describe three typical urban environmental crises in the development of Scandinavian (and European) cities: a *hygienic* crisis in the late nineteenth century, and in the twentieth century a *social* crisis dominated by poor unhealthy housing, and an *ecological* crisis connected to the polluted city environment. The Øresund cities provide typical examples of these crises as well as of the efforts to solve them. Similar to many other fast-growing industrial cities in Europe, water and sanitary issues became a major concern in Malmö, Copenhagen and other cities in the region in the late nineteenth century.¹⁹ After decades of frequent and intense debates and gradual investments in water infrastructures, the solution in the early twentieth century was that all wastewater was collected and released into the Sound. In western Copenhagen, a biological wastewater treatment plant opened in 1920, but plans for a larger and

all-embracing treatment plant were not realized until 1980. In Malmö a plant of this kind opened a decade earlier.

During the first half of the twentieth century, Copenhagen was among the most densely populated cities in Europe,²⁰ and the population in the central parts of the city continued to grow until after the Second World War. In the crowded inner city, housing was mixed with industry, and most of the problems of the early industrial European city still existed until the 1960s: overcrowding, unhealthy apartments, lack of light and fresh air, and related health problems. Industry made noise and created risky situations with transportation and the use of hazardous chemicals in the vicinity of housing areas. Coal and coke remained the dominant source of energy, and air pollution was a severe problem. During the post-war economic boom, pollution problems received increasing attention. The first air pollution measurements in the 1940s showed that areas in the centre of Copenhagen were more polluted than London.²¹ When regular air quality measurements started in the early 1960s, the average SO₂ (sulphur dioxide) level in central Copenhagen was about 80 µg/m³ in the summer and 120 µg/m³ in the winter, which can be compared with WHO's recommended ceiling of 50 µg/m³ SO₂. Malmö had similar levels until the early 1970s. Coke was also widely used in Malmö for heating, gas production and industrial machinery, but the energy sector diversified earlier in Sweden with electrification based on hydropower resources in the northern part of the country.

From the late 1940s the solution to the inner-city over crowding was massive housing construction on the periphery of the cities. Movement out of the crowded inner city commenced in Copenhagen already in the early 1950s, when both industry and people started to seek space on the periphery. In Copenhagen, the inner city population decreased by approximately 40% between the 1950s and the 1980s, and today only about one third of the population of the metropolitan area live in the inner city. In Malmö, the dramatic expansion with the construction of large peripheral housing estates culminated with the so-called "million programme" (the construction of over one million dwellings between 1965 and 1974 in a country of about eight million inhabitants). Parallel to the expansion of both cities, the inner cities became the object of large-scale renewal. In Malmö, a radical reshaping of large areas of the inner city took place through demolition and new construction, while in Copenhagen inner city transformation was more selective. In both cities, inner city "revitalization" included new infrastructure and green space.

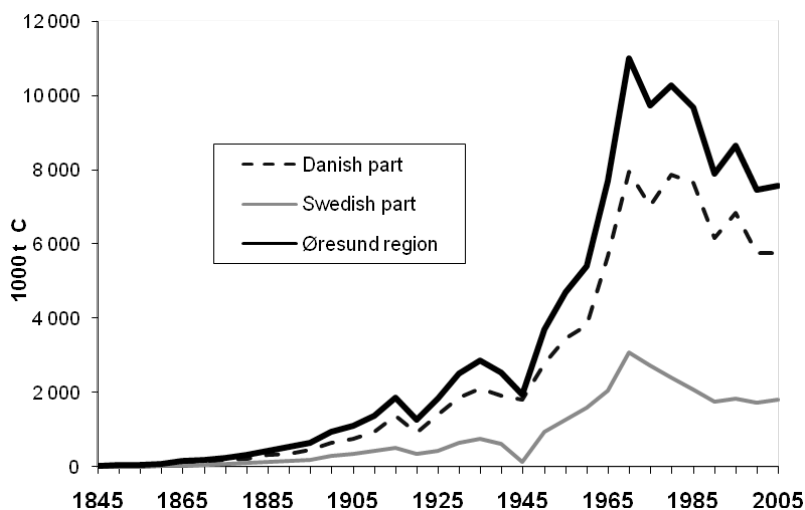
In the 1960s and 1970s, satellite towns dominated by small houses started to grow rapidly farther and farther out from the major cities, providing the middle class with housing alternatives. A more polycentric settlement structure emerged in the region, and this structure has actually been strengthened in recent years when the major cities once again are experiencing population growth. The private car was the necessary prerequisite for this development that has further stimulated the increasing road traffic in the region.

Regional energy use and pollution development

Since the beginning of industrialization the Øresund region has relied to a large extent on imported energy and other natural resources. However, the coal mines in Scania were definitely of great regional importance, and covered most of the coal consumption.

Figure 4 shows an estimation of the regional emissions of CO₂ from fossil fuel combustion, which represents a totally dominant part of the greenhouse gas emissions.²² CO₂ emissions also reflect the development of the energy system. Coal and coke were the dominating energy source in the region until after World War II, when imported petroleum and electricity from Northern Scandinavia became increasingly important. Until the 1970s, the emissions were increasing, particularly rapidly after the Second World War when both industrial production and household energy consumption rose rapidly with increasing standards of living.

Industrial pollution was traditionally connected to use of fossil fuels, use of inputs such as dyes and chemicals in textile industry and waste from various processes in e.g. large-scale food factories such as sugar plants, and more diffuse pollution from the numerous metal workshops. In comparison with metal, coal and forest industry regions in other parts of Europe and Scandinavia, there have only been few representatives of the most polluting industrial branches. The most important industrial pollution sources in the mid-twentieth century were power plants, rubber, cement, and fertilizer factories, and some other chemical plants, and secondary metal smelters and leather factories. Northwestern Scania and the western suburbs of Copenhagen still have important concentrations of environmentally hazardous industry.

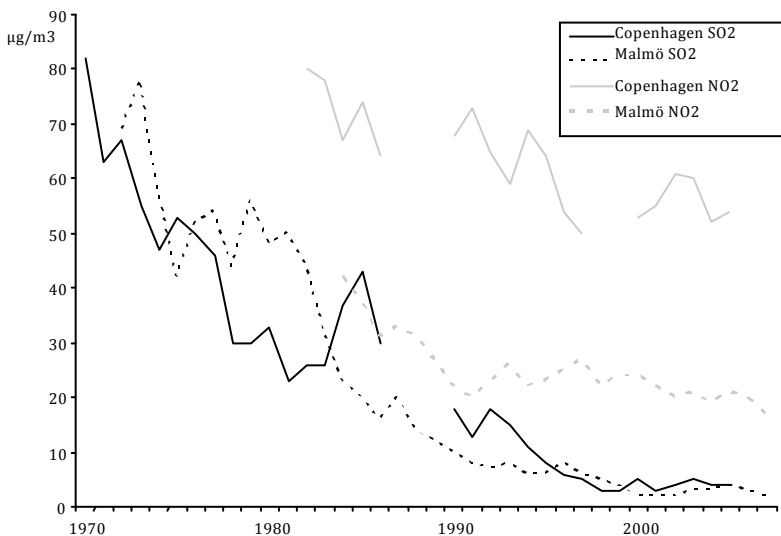


4. CO₂ emissions from fossil fuel combustion in the Øresund region 1845–2005

Single improvements occurred earlier, but the trend-break in regional pollution of CO₂ and other pollutants did not come until the 1970s. CO₂ emissions decreased in the coming decades due to a combination of industrial restructuring, stagnation of fossil fuel use, energy efficiency increase (most importantly the heating of buildings), and changes of energy system with the introduction of natural gas, nuclear power (in Sweden) and later increasing use of renewable energy sources (biomass in Sweden and wind power in Denmark). Denmark is a country that over a long period has combined high economic growth with stable energy use and provides perhaps the best international example of “decoupling”.²³ Emissions of other pollutants also started to decrease in the late 1960s and early 1970s with the implementation of environmental legislation, resulting in widespread introduction of pollution control, and changes in urban energy systems. This development was reinforced by the industrial restructuring from the mid-1970s.

Improved urban environment

Figure 5 shows the development of concentrations of sulphur and nitrogen dioxides in the air in the centres of Copenhagen and Malmö. The improvement in air quality began in the 1960s with the replacement of coal and coke with oil and investment in district heating. Today, 96% of Copenhagen's apartment buildings and 90% of Malmö's are connected to remote heating networks. This development continued in the 1970s with pollution control, the closure of some heavily polluting factories, and decreasing fossil-fuel-based heating. Today, the main source of air pollution is road traffic. Atmospheric concentrations of the typically car-related pollutants nitrogen dioxide and ozone have been relatively stable since the 1980s.



5. Average atmospheric concentrations at monitoring stations in the city centres of Copenhagen and Malmö 1970–2005²⁴

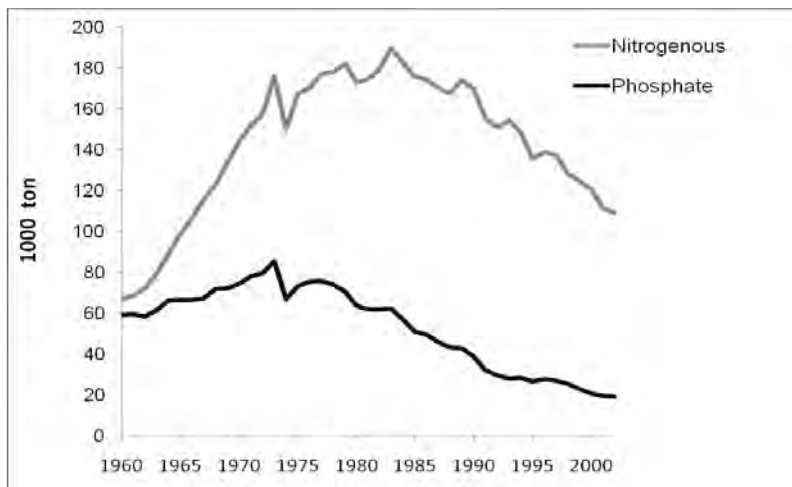
The development of water quality is even more remarkable. On the Swedish side of Øresund, a dramatic decrease of emissions from urban areas occurred already before 1975 when tertiary treatment wastewater plants with phosphorus removal were built in almost all municipalities. In Denmark, water pollution control developed more slowly, but emissions to Øresund have been reduced by 80–90% since the 1980s. All

major cities in the region today have centrally located beaches which are very popular and crowded during summer. The beaches in central Malmö have cleaner water than most beaches in Sweden, and in Copenhagen, a city beach opened a few years ago in the south harbour.

UNSOLVED ENVIRONMENTAL ISSUES

The major trend in the regional pollution landscape in recent decades has been a dramatic change from a traditional “immission landscape”²⁵ with a sharp contrast between the polluted city and the “clean” countryside, towards a more complex situation in which pollution sources are more diffuse and increasingly related to traffic, consumption and agriculture.

The great unsolved environmental problems in the Øresund region today are the environmental impact of agriculture and road traffic. In rural areas, the negative effects of modern agriculture became more obvious in connection with the dramatic development of agriculture in the mid-twentieth century, with accelerating landscape transformation of agricultural landscape, including dramatic hydrological changes, and increased use of machinery, chemical fertilizers and pesticides. In Scania, the agricultural use of chemicals became an important issue in the 1960s when the connection between the disappearance of birds of prey in the agricultural landscape and the use of mercury compounds for seed protection received attention.²⁶ Eutrophication of lakes due to nutrient leakage from agriculture also received attention early, and in the 1980s special regulations were introduced around Lake Ringsjön in central Scania that increased possibilities to control fertilizer use and related outflows of nutrients.²⁷ Dramatic algae blooming events in the 1980s and 1990s made eutrophication and the environmental effects of agriculture for water pollution an important environmental issue in Sweden, and a dominating one in Denmark. The use of chemical fertilizers (Figure 6) stagnated in the 1970s and 1980s after a long period of dramatic growth and has decreased in recent decades, probably most importantly due to the introduction of fertilizer tax. However, the effects of this decrease have only been diffuse, and despite many policy initiatives, the problems of nutrient run-off still persist in lakes, fjords as well as the Baltic Sea.



6. Use of phosphate and nitrogenous fertilizers in the Øresund region²⁸

Road traffic has continued to grow in the region, and problems of road congestion have increased dramatically in recent years, especially in Copenhagen, disturbing its ambitions to be an environmental metropolis. The number of vehicles passing the boundary of the city of Copenhagen increased by 30% between 1985 and 2004, resulting in decreasing speed on major city roads.²⁹ In spite of ambitious investments to increase public transport capacity and dramatic increases in the use of public transport on both sides of Øresund,³⁰ there are few signs of any structural shift away from car traffic. It is only in the inner cities that public transport, cycling and walking play any significant role for daily transport. Peripheral shopping and business zones are expanding in the region. Car ownership and commuting have actually increased dramatically during the economic expansion of the last few decades, particularly in the inner cities. Between 1995 and 2005, the number registered cars in the city of Copenhagen increased by 29%. Regional commuting patterns have become more dispersed, complex and difficult to cover with public transport. The majority of the working population in the region work outside their municipality of residence. In recent years the fastest-growing commuter flow are into the Copenhagen and Malmö region from areas outside the metropolitan areas and the commuting of residents in the inner cities.

RECENT FLOW TRENDS

The development of resource flows in Greater Copenhagen shows some interesting trends³⁰ in the last half century that are of relevance for the whole Øresund region. Most important is that the use of energy has stabilized in recent decades and water use has decreased quite dramatically. Household consumption has grown and changed. In particular the number of machines and other complex products and chemicals has increased, but use times have often decreased.

The increasing consumption has contributed to increasing solid waste generation. Despite the decrease in employment and in the GDP contribution of manufacturing, manufacturing waste (not including construction and demolition waste) in the Copenhagen area is surprisingly stable and still almost as important as household waste. Waste from the service sector has grown dramatically in recent years.

The hinterland is no longer the self-evident base for food and other resources, and the provision of both goods and food has become increasingly international. The most dramatic increases in connection with food imports during the last 50 years do not concern traditionally imported food products such as fruit and vegetables but rather traditional Danish exports such as meat, sugar and dairy products. Sweden was long almost self-sufficient in terms food, but during the last 15 years, food imports, particularly from Denmark and Germany but also other countries in the European Union, have become important. The dramatic increase of hotels, restaurants, fashion and luxury shops in central Copenhagen indicates the city's growing importance as a tourist centre. The transport of goods through the large harbour long dominated Copenhagen's exchange with the surrounding world, but instead of freight vessels, naval ships and ferries, the harbour is now dominated by cruise ships and Copenhagen airport has long been the largest workplace in Denmark. The passengers not only consist of tourists, but also come for business and conferences. The important growth of tourists, trade and travel today, however, are only physical reflections of the development of international exchange in the growing internationally oriented service economy in the Øresund region.

CONCLUSION

During the last 200 years, the Øresund region has undergone dramatic transformations which have not only changed the economy, settlement patterns and daily lives of its inhabitants but also fundamentally transformed its environment and landscapes. The structural changes can be viewed as regional outcomes of global megatrends that have influenced the region, but these have been shaped by the particular regional historical and geographical context. Industrialization and urbanization transformed the region from an agrarian society in the nineteenth century to an urban welfare society, dominated by industrial manufacturing during most of the twentieth century, and later increasingly by the service sector. Landscapes have been reshaped by the agricultural revolution, urbanization, and continuous modernization of agriculture and forestry as well as more recent developments of recreation and landscape protection. Improved transports have increasingly influenced settlement patterns, and a polycentric urban structure with increasingly interconnected labour markets in the region is emerging. Flows of natural resources and goods have not only grown by several dimensions, but also expanded geographically and diversified with more complex products, and over time generated large amounts of waste in connection with both production and consumption in the region. Direct losses to the environment of most traditional pollutants have decreased dramatically in recent decades and particularly urban environment has improved considerably, but traffic and transports, waste generation, the effects of intensive agriculture, and the use of a multitude of chemicals in various products remain important challenges. The international exchanges of the Øresund region have also grown enormously but varied in importance and character. In recent years, the international exchange of the region has become more diversified by increasing immigration, tourism, trade in services and a wider spectrum of goods, and all forms of professional and private exchanges.

Despite the national frontier and rather limited exchange between the Danish and the Swedish parts of the region during most of the industrial period, and despite the fact that they have had very different positions within their countries, the similarities in the development are predominant. The similarities in the industrial process can to a large extent be explained by the beneficial agricultural conditions, which not only stimulated agricultural development but also very diversified development of industry. Similar regional specializations have continu-

ously developed on both sides of Øresund from traditional industry, including food, brick and cement, agricultural machinery and inputs, over shipbuilding and pharmaceuticals to current Øresund clusters of biotech, IT, environmental technology, and more traditional food and transports. There have also been differences, mostly because the economy in the Danish part always has been larger and more diversified in terms of manufacturing, administration and services. In Scandinavia, however, the historical diversity of manufacturing in Scania can only be matched by capital regions.

Different national policy developments between the two countries have created some differences between the two parts of the Øresund. The most important national difference has probably concerned food and agricultural policies. The Swedish reintroduction of agricultural trade barriers in the late nineteenth century and the aspiration for self-sufficiency had the result that the equally important food sector on both sides of Øresund for centuries had totally different market and competition conditions.

An important difference between the two countries concerns the energy system and its development. Denmark is still totally dependent on fossil fuels for electricity production, which in Sweden relies on water power and nuclear power. Electricity consumption is also traditionally much higher in Sweden. Recent developments, particularly with wind power in Denmark and biomass in Sweden, are also rather country-specific.

In other areas, differences in national economic and policy developments have mostly concerned timing. Industrialization and urbanization started earlier in Denmark, but was much slower than in Scania and Sweden. During the post-war period Sweden was long a wealthier country, and ahead of Denmark in the development of the welfare society. This may also have influenced the introduction of environmental policy. The early development of almost fully comprehensive tertiary wastewater treatment in Sweden was far ahead of all other countries. The concern for the environmental costs of modern agriculture received attention earlier in Sweden, but in Denmark it has become the dominant theme in the environmental debate. Other environmental developments have been rather parallel in time and to some extent followed similar trends to other Northern and Central European countries such as Germany, Britain, Netherlands, Austria and Switzerland. This concerns e.g. the improvement of the urban environmental quality, the implementation of environmental legislation, the development

of urban district heating and stagnation in energy use and decreasing emissions of traditional pollutants.

With its recent development, the Øresund region is increasingly characterized by trends similar to those in the most dynamic city regions in different parts of the world, including increased qualified services, international orientation and tourism, large-scale immigration, regional enlargement and increased long-distance commuting, demand on the built environment and land for urban development. While the trends in energy and water use in Northern Europe differ from what is found in many other big city regions,³² problems with increasing traffic and waste seem general. This also concern problems of increasing social disparity and tensions in current metropolitan regions. The regional water pollution problems are shared with intensive agricultural areas in Europe and the rest of world.

NOTES

- 1 The concept of ecological modernization was introduced by Joseph Huber in *Die verlorene Unschuld der Ökologie. Neue Technologien und superindustrielle Entwicklung*, Frankfurt am Main: Fischer Verlag, 1982. Examples of how ecological modernisation has influenced national and regional policies and strategies can e.g. be found in Gibbs, D., "Ecological modernisation, regional economic development and regional development agencies", *Geoforum* 31(2000):9-19; Fudge, Colin & Janet Rowe, "Ecological modernisation as a framework for sustainable development: A case study in Sweden". *Environment and Planning A*, 33(2001):1527-1546.
- 2 Stefan Anderberg & Eric Clark "The green and sustainable Øresund region: Eco-branding Copenhagen and Malmö", in Igor Vojnovic (ed.), *Sustainability: A Global Urban Context*, Michigan State University Press (in press)
- 3 *Miljöprogram för Øresundsregionen*, 2001, p. 5, translation by the author
- 4 Malmö and Copenhagen were in 4th and 6th place, respectively, on the list of *15 green cities in the world* published by the American environmental magazine *Grist* in 2007 (www.grist.org).
- 5 Stefan Anderberg & Eric Clark (in press); Stefan Anderberg & Erik Slentø, "Stof- og energistrømme i bylandskabet: Storkøbenhavns miljøhistorie", in Sten Engelstoft (ed.), *Byen i landskabet – landskabet i byen*, Geografforlaget, pp. 102-120; Stefan Anderberg, "Hållbar stadsutveckling i Øresundsregionen – Köpenhamns och Malmös gröna profilering", *Geografiska notiser* 2009:1:23-33; Stefan Anderberg, "Ekologisk modernisering i Øresundsregionen? Miljø – centralt i Øresundssamarbetet", in Christian Wichmann Matthiessen (ed.), *Geografers forskningsbidrag til det Øresundsregionale udviklingsprojekt*, pp. 67-80. Kulturgeografiske skrifter, bd. 14. Copenhagen, Reitzels Forlag, 2005; H. Søgaard, A. Lindroth, N. O. Jensen, S. Anderberg, M. Svensson, E. Dellvik & S. Møller, *The carbon dioxide budget of a growing metropolitan region of northern Europe*, Øresundsuniversitetet, Forskningsrapporter 2001:159-168.
- 6 Unless otherwise stated, all figures are based upon official statistics in Sweden (Statistiska centralbyrån) or Denmark (Danmarks statistik)
- 7 *Prices and earnings: A Comparison of purchasing power around the globe*, March 2008, UBS.
- 8 Viggo Hansen, *Dansk bebyggelsegeografi*, Særtryk fra Danmarks Natur 9. Københavns universitets geografiske institut, Publikation 141, 1976.
- 9 Unpublished inventory of the Swedish industry in 1830 in connection with the study "The Economy and the Biosphere in Sweden during 300 years". This study is presented in Hägerstrand, Torsten

- and Ulrik Lohm, "Sweden", in B. L. Turner II, W. C. Clark, R. W. Kates, J. F. Richards, J. T. Mathews and W. R. Meyer (eds.), *The Earth as Transformed by Human Action. Global and Regional Changes in the Biosphere over the Past 300 Years*, Cambridge University Press, 1990, pp. 605–622.
- 10 R. Edvinsson, *Growth, Accumulation, Crisis: With New Macroeconomic Data for Sweden 1800–2000*, Almqvist & Wiksell International, Stockholm, 2005, presents a higher figure (11.2%) for 1870.
 - 11 R. Willerslev, *Den glemte indvandring: Den svenske indvandring til Danmark 1850–1914*. Gyldendal, København, 1983. The number of Swedish emigrants 1860–1920 has been estimated at 80,000–90,000. In Malmöhus County, Denmark was almost as important as North America as emigration destination.
 - 12 G. Fridlitzius, *Swedish corn export in the free trade era: Patterns of oats trade 1850–1880*, Samhällsvetenskapliga studier 13, Lund, 1957.
 - 13 Hansen, pp. 64–72, 108–109. The profitable agriculture and rural industrial development are also common explanations for the slow urbanization in Denmark in the nineteenth century.
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 - 15 The central parts or inner city refer to the former statistical region Hovedstaden (the capital) that consisted of the municipalities of Copenhagen, Frederiksberg and Gentofte.
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 - 21 Johannes Fenger, *Luftforureningens historie: fra et indendørs til et globalt problem*, 2nd edition, Hovedland, 2004.
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- 27 L.-A. Hansson, M. Enell & E. Bergman, “Lake Ringsjön: Its Catchment Area, Its History And Its Importance”, *Hydrobiologia* 404 (1999), pp. 1–7.
- 28 Calculated from national data from the FAO. Data on regional use of fertilizer has been used to estimate the region’s part of the national consumption in different periods (the regional part of the total fertilizer consumption in Sweden and Denmark is about 25–30%.)
- 29 Anderberg & Slentø, pp. 111–114
- 30 Anderberg, 2009, p. 31. Public transport in Scania in the last 15 years has increased by about 7% per year.
- 31 Anderberg & Slentø, pp. 114–118.
- 32 Cf. C.A. Kennedy, J. Cuddihy and J. Engel Yan, “The Changing Metabolism of Cities”, *Journal of Industrial Ecology* 11(2007):2:43–59.

THE EUROPEAN FISHMONGER

The great herring fishery in the Øresund 1200–1600

Carsten Jahnke

This article is about fish, especially herring, one of the most important medieval foodstuffs. It is a matter of common knowledge that nowadays the Netherlands is the herring centre, but 600 years ago people in Holland were not allowed to buy Dutch herring – and they would not have done so, because its quality was too bad. The most and only herring that time came from the Øresund, as it did for four to five hundred years.

AND THE LORD CREATED A FISH WITHOUT BONES...

In old times, fish could only be used in coastal areas. It was not possible to transport fresh fish over great distances, meaning distances of more than 100 to 150 kilometres, because it is so perishable. Therefore only people in the coastal areas, such as the Danish islands or Scania, were used to eating different kinds of fresh fish.¹ But from time immemorial these coastal people tried to conserve fish by drying, smoking or salting.

In Denmark every autumn thousands and thousands of herrings (*Clupea harengus*) passed the Øresund on their way to the spawning grounds in the southern Baltic Sea. Because of the geography these herring-shoals met in the narrow and shallow waters of the Øresund,

where they were (and are) easy to catch. So it is no wonder that the farmers of Zealand, Lolland, Falster and Scania settled on this fish to obtain a sufficient winter stock.

Because of the wet climate in Denmark it is not possible to dry fish properly. Therefore, also since time immemorial, the Danish imported salt from the southern Baltic to conserve their herring. At the outset, this salt came from the Slavonian town of Kolberg/Kolobrzeg in present-day Poland,² and the coasts of Scania and Zealand were one of the most important meeting places of Slavic and Nordic culture.

At the very same time salted herring started a triumphal procession throughout Europe. After the year 800 more and more areas of Western and Eastern Europe were Christianized. This meant that more and more people were liable to the Catholic and Orthodox fasting rules. Christians were meant to fast at Easter and Advent, and also on Wednesdays, Fridays, Saturdays and other major holidays. These rules affected not only monks and clerics but also lay people, who were now urged to fast for 120 to 182 days per year.³ On all these days the people had to abstain from meat, and this opened a brand new market for substitutes – especially for salted herring, which is easy to portion and eat and can keep for up to three years.

Around the year 1000 a remarkable fish appeared in Switzerland, created by the Lord without bones, as Thomas de Cantempré, a monk in St. Gall, praised at the beginning of the thirteenth century, swimming in brine and with the crazy name of *haring* or *halmarius*. After two hundred years of Christianization there was a huge market for salted fish, from Scandinavia in the north to Italy in the south.⁴

THE RISE OF THE SOUND FISHERIES⁵

Around 1100 German merchants imported salted herring from two areas, on the one hand from England and on the other hand from the Slavonian island of Rügen off the south coast of the Baltic, in the present-day German state of Mecklenburg. This island was situated in a pagan land – but that did not matter. The Germans came with salt from the salt deposits of Lüneburg in Lower Saxony, one of the best salts in Western Europe, and received the required herring in exchange from the pagans.

On this route, Lüneburg–Rügen, the city of Lübeck was “founded” in 1158. The Lubeckian merchants based their power on a near monopoly of the salt supply from Lüneburg and so they got the best herring. Parallel to this, they developed new markets in central Europe and thus grew steadily in importance.

After forty years, around 1200, the Lubeckians detected the Sound area and its rich fishing resources. It was not only the fish that attracted the Lubeckians, but also the possibility to sell their other trade goods, such as cloth or spices, to the Danish farmers. For both sides this trade was a very good affair, or as a Lubeckian monk mocked at the beginning of the thirteenth century:

“On the honour of the Danes. The Danes who imitate the habits of the Germans, which they know well thanks to living so long in their neighbourhood, are now adapting the dress and weapons of other nations. Formerly, they used to dress like seamen because they lived close to the coast and have always been occupied with ships but now they clothe themselves not only in scarlet and parti-coloured and grey furs but also in purple and fine linen. The reason is that they all became very rich because of the fishing, which takes place every year around Scania. While the fishing is taking place, merchants come there from all the surrounding nations with gold, silver and other treasures to buy herring from the Danes, herring that they catch at no cost by the abundant grace of God, while the merchants, in order to make a good bargain, offer the best they have, and sometimes even their lives in shipwreck.”⁶

But it was not only the possibility to sell their own and buy Danish goods that attracted the German merchants. Short after the Lubeckians came not only other merchants from the Baltic Sea area, but also from the North Sea and from England and Scotland. The attraction of the Sound was not only the fish, but also the possibility to trade directly with other merchants. In this way, the Scanian markets developed from around 1250 into one of the most important transfer points of the medieval European trade. Here the western and eastern market systems were connected and here people could not only buy herring, but also Russian wax and fur, spices imported via Lemberg/Lwów in present-day Belarus, Prussian amber, cloth from England and Flanders and other luxury goods from the west, among many other goods.

THE ORGANIZATION OF THE FISHERY AND THE MARKETS

But the primary source of all activities was certainly the big herring fishery in the Øresund. The big herring shoals pass through the waters of the Sound from the end of August until November. At this time, thousands and thousands of fishermen assembled at the beaches around the Øresund, to get their part of the silver of the sea. In the heyday of the markets at the end of the fourteenth century more than 80,000 fishermen participated in that catch, and some more in the manufacturing of the brine and the barrels, an unfathomable number of people.

These fishermen came not only from the Danish islands and Scania but also from all over northern Europe, from Germany, Holland, Flanders and perhaps from England. They formed fishery communities of six to eight men, known as *notlag*, running one boat. The whole fishing-organization was totally free. Everyone with sufficient equipment was able to take part in these fisheries – as long as they paid the right taxes to the king.⁷

Because of a special ruling in the law of northern Europe, all beaches belonged to the king. This was the key for him, to siphon off the revenues of the fisheries, because everyone has to pass the beaches to come to the prey. In the heydays of the fairs, before the fifteenth century, the revenues from the Scanian fairs were the most important part of the royal budget. Poul Holm estimated that the value of all fish exports from Denmark in the Late Middle Ages was two or three times bigger than that of the export of bullocks and one and a half times greater than the export of all agrarian products together.⁸

The fishermen were allowed to use two kinds of net. During the daytime some of the fishermen used fixed nets, others used driftnets at night. The fishermen were free to choose the fishing technique, only fishing with trawl nets was strictly prohibited.

The fishermen settled directly on the seashore in little huts. They teamed up in regional groups, mostly defined by their home region in *fiskelejer*, fishermen's camps. Life at these camps was very rough and the tone and atmosphere were very hard, depending on the success or failure of the catch. Mass brawls were often reported, and the king's major challenge was, to prevent serious trouble or diplomatic resentment from arising out of this.

Behind the beaches the merchants had their own small towns, known as *Vitten*. These merchant's marketplaces attained the status of

extraterritorial urban emporia in the course of the fourteenth century and formed a special case in the history of medieval European commerce. In the *Vitten* the merchants owned their own huts, marked with their sign on the top of the gable wall. These huts lined streets, such as the shops of the butchers and bakers, the cloth-merchants and grocers, the pubs and brothels. The *Vitten* had their own churches and branches of the home monasteries of the traders and were governed by an urban bailiff.

At these *Vitten* the merchants lived under their own rights and the law of their hometown. They were free to trade with each other and with their Danish colleagues and they tried to trade with the local farmers also, much to the displeasure of the local merchants. In the time from the Feast of the Assumption, 15 August, until St. Dionysius's Day, 9 October, or St. Michael's Day, 11 November, these places were the focal point of the whole trade in Northern Europe and one of the most important fairs in the Middle Ages.

The most important meeting place of fishermen and merchants was on the peninsula of Halør. Here the little cities of Skanör and Falsterbo emerged.⁹ There were other places of this kind a little further into the Øresund. Some of them, like Malmö, Copenhagen or Landskrona, developed from fishermen's camps into important merchant cities, autonomous from the temporary fisheries.

PROCESSING THE FISH

Processing the herring at the Scanian fairs was a sophisticated system based on the division of labour.¹⁰ After the catch, the fish were sold on the beach. This was the only place the merchants were allowed to meet the fishermen, although they tried to avoid this constriction. After the sales transaction the fish were transported by special men from the beach to the *Vitten* into separate processing huts, known as *styrterom* (turn-in rooms), where the fish were gutted by women called *gællekoner*, gutting women.

After gutting the fish were laid in barrels by female specialists, the *læggekoner* or laying women. These women place some 830–840 Scanian herrings in one standardized Rostock barrel and mixed them with Lüneburg salt and water. These women were responsible for the quality of the herring produced, so that only herring of a special quality

and size and the best salt was used; they and the product were checked again by Hanseatic herring controllers, known as *wrackers*. The *wrackers* branded the ready barrel with a special sign, the *circle*.

This circle gave information about the place of production and the quality of the herring, and together with the brand of the producing merchant the circle guaranteed the quality of the product and the responsibilities if a buyer exercised the right of recourse anywhere in Europe.

This brand and its securing system was the reason why, for example, Dutchmen were not allowed to sell other than Scanian herring. In 1395 a merchant in Maastricht, selling other than Scanian herring, had to announce this by a palm leaf, *palmtak*, at his door,¹¹ and in 1394 the Scanian method of preparing herring was introduced to the Scarborough herring fishery, to secure the quality and to prevent other problems with the sale of this product.¹²

THE SCANIAN FAIRS AS AN INTERNATIONAL MARKET

Because of its quality but also because of the convenient geographical situation of the Scanian fairs and because of the market freedoms there, the Scanian herring was found all over Europe, from Russia in the east to England and Ireland in the west, from Greenland in the north to Italy and Spain in the south.¹³ In the fourteenth century this product dominated the whole market. It can be shown that, from the thirteenth century onwards, the harvest workers in Sedgford, England, the soldiers at Dirleton in Scotland around 1300,¹⁴ the workers at a vineyard in Heilbronn, Germany, or the inmates of hospitals around the continent from Lemberg/Lwów in the east to the British Isles in the west had the Scanian herring as a common diet.¹⁵ Herring was so common that the first day of Lent, Ash Wednesday, was known in England as *King herring* and in Württemberg as *Heringstag*.¹⁶

The Scanian markets were not only economic hotspots; they were also zones of contact. In the herring-fishing season the whole population of the Danish islands and Scania dropped everything and headed for the beaches. At this time no bishop was able to inspect local churches, no one met in council and no teaching took place at schools.

At the Øresund the locals met not only their own folk but also people from many different places and cultures. The Scanian fairs therefore served as the political and cultural meeting point par excellence. For example, the first Lutheran doctrine came to Scandinavia via the Scanian fairs and many political negotiations took place here. The markets with their merchants were not a foreign body in the kingdom of Denmark, but an essential part of the economic and cultural flux in Europe.

THE CATCH AND THE BIOMASS

It is hard to estimate how many species of fish or how many tons were caught in the course of the Middle Ages. Poul Holm estimates the minimum medieval annual Danish herring export at 100,000 Rostock barrels,¹⁷ which means about 84,000,000 herring a year. But there are only two customs rolls linked directly to the Scanian fairs, so every figure is based on a very small data sample. In 1375 the merchants trading between Malmö and the south of the Baltic Sea exported 32,571½ Rostock barrels,¹⁸ their colleagues from the North Sea areas shipped about 18,720 Rostock barrels from this harbour alone.¹⁹ In 1494 the fishermen at Skanör and Falsterbo caught about 60,000 Rostock barrels.²⁰ In the archival sources we can find some more information about the quantities of imported Scanian herring. In the harbour of Lübeck, for example, merchants in 1398 declared a figure of 71,230½ Rostock barrels, rising in 1399 to 81,172½ Rostock barrels, and in the year 1400 the number was 69,975½ Rostock barrel, corresponding to 58,779,420 herring.²¹ In the period between September 1374 and May 1375, a total of 12,721 Rostock barrels were declared in the harbour of Sluice, in the same September–May period for 1376–1377 the number of Rostock barrels shipped from Scania to Flanders was 24,533, in 1377–1378 it was 29,787 and in 1378–1379 22,740.²²

Over many years the ecological conditions permitted a constant catch of these big quantities. In some years, the appearance of masses of herring, known as *Stimen*, is recorded, when there were so many fish that it seemed that the water was boiling and the fishermen were able to catch the fish with their bare hands. In other years, as in 1402, 1425, in the years after 1436 and in 1469 and 1475 only a few herring came to the Øresund,²³ but it is not clear now how many this “few” was. But

normally the herring stock in the Øresund was of constant size and the fishermen were able to catch as many fish as the merchants needed to supply the European market.

In the atmosphere of market economy and in the absence of traditional guilds and other organizations, ecological awareness was not of top priority. Nevertheless, some rules secured the natural habitat of the herring, although the starting point for this was not necessarily ecological thinking.

On the one hand, there was a mythical awareness about the risk of overfishing in the form of the legend of the herring king. This herring, a special big and spotted one, was not, under any circumstances, to be caught. This meant that some particularly big individuals had to be allowed to survive the passage through the Sound, to reproduce the stock. People were aware of this, and as on 27 November 1587 a guilty fisherman in Norway caught one such fish, the Norwegian-Danish king felt obliged to ask Europe's leading universities about this phenomenon. But it was too late. The king died the next year and the herring never came back to Norway.²⁴

The herring was not only protected by myths, but concrete provisions secured the herring population as well. Because of the merchants' need for herring of a special size and quality, the width of the meshes was standardized; in 1386 this saved the young members of the stock. In the very earliest regulations for the Scanian markets there was a paragraph prohibiting the use of ground nets, *wantegarn*, which could destroy the spawning grounds. This regulation was not made for environmental reasons, but because it was believed that ground nets were unfair. In any case, this was a protective measure. The sovereign effectively controlled the regulation of mesh sizes and the kind of nets when the fishermen brought their catch to the beach. In this way, economic needs and ecological considerations fitted together.²⁵

THE END OF THE SCANIAN FAIRS

In the year of Our Lord 1402 the people said: "Because the queen Margret of Denmark let burn a man at the Scanian market, who called himself her son Olaf, the almighty God took away the herring from Scania".²⁶ And some years later the same author noted: "In the year of Our Lord 1425 in the autumn there was no herring in Scania [...]"

irrespective of where it was and why it happened, there was no herring at the Øresund [...] and the herring didn't come back, but the herring in the sea went for some part to Flanders and for another part to Heligoland in the North Sea. Why Our Lord took away his grace from Denmark is just His secret."²⁷

Since the beginning of the fifteenth century more and more writings on the wall announce the approaching end of the Scanian markets. At the moment we have two patterns of explanation for this. The old one, in the tradition of the sixteenth-century historiographer Johannes Bugenhagen,²⁸ explained the end of the markets in terms of biological fluctuations of the herring stocks. Even if the relocation of the herring from the Øresund to Pomerania, Heligoland, Flanders/Holland and England is a myth, the evidence that less herring was caught in the Øresund becomes more abundant.²⁹ This has nothing to do with the growing fisheries in England/Holland, because we find another herring stock there, but with fluctuations in the regional herring stock. Until now, no fully valid explanation has been found for this phenomenon. Perhaps it has something to do with the salinity of the water, maybe with the water temperature or something else.

A newer theory connects the end of the Scanian markets with political and economic processes in Europe. After 1370 the Hanseatic towns of the south-western Baltic tried to exclude their rivals in business from the Scanian Markets. The fairs thereby lost their international character and the ousted colleagues of the Lubeckian merchants thought of the old (and hitherto unused) fishing grounds of the North Sea. Because of this the steady rising of the North Sea fishery has some parallels with the decline of the Scanian herring fishery.

Both theories have something to be said for them – perhaps we can find the solution in a combination of the two.

Be that as it may, the decline of the Scanian markets began in the fifteenth century and intensified during the sixteenth century. More and more international merchants now bypassed the Scanian markets and sailed directly through the Øresund into the Baltic, first the English and Flemish, later the Dutch and then others. Many of them came with their own herring to the Baltic markets, crowding the Scanians out of them.³⁰

In the sixteenth century only regional merchants came to the Scanian fairs, at the same time as the Danish kings were increasing pressure on foreigners in favour of their own subjects. The fisheries in the Øresund

were decentralized and many small fishery settlements emerged along the coasts, as the big international market disappeared.

When the Swedish king occupied Scania in 1658 his officer in charge reported to him that in the very same year only one lone small ship came from Lübeck to Scania, just to see whether there really was no herring and to secure the privileges of the town, but the mission failed.³¹ The trade with Scania had declined in importance and in 1674 the Lubeckians sent their factor to Scania for the last time. After 500 years, the fairs ceased.

FISHERIES BESIDES THE SCANIAN FAIRS

The Sound is certainly not only home to herring, but to many other species as well. And certainly the people in the Øresund had not only caught *Clupea harengus* but many different kinds of fish.³² Most of this fishing proceeded in connection with the urban fisheries of, for example, Copenhagen, Elsinore or Malmö. These urban fishermen were full-time professionals, supplying the urban market with daily foodstuffs. At the time of the Scanian markets these fishermen were competing with the many thousands of rivals coming to the Sound. To secure their rights, they received many special privileges, excluding others from their own markets.

Another development proceeded after the dispersion of the centralized Scanian Markets. The new small fishermen's villages around the coast no longer specialized in herring, but in many fish, for example, cod and flatfish.³³ These settlements supplied many regional markets and their fishermen travelled around from Bohuslän in the north to the German coast in the south. Some of these fishermen continued farming, others became full-time fishermen. But most of these fisher communities stayed poor; although some of them have survived until today, such as Gilleleje in northern Zealand or Barsebäck in Scania, most of them disappeared in the course of history, washed away in surges or by the ravages of time.

CONCLUSION

In all times the Øresund was the linking element in this region. Not only seamen and fishermen regarded the Øresund as a bridge but also “normal” people, the farmers, pupils and others on both sides of the Øresund. The Øresund was one of the main resources for winter stock and at the same time a resource of international significance.

The Scanian fairs placed Denmark not only on the international economic map but also made the Sound into one of the most important economic and cultural exchange points of the Middle Ages. The importance of this region was far-reaching. In 1368 not only the city of Cologne decided to defend its interests at the Scanian markets, but also the parliament in London discussed the situation there, as did the Master of the Teutonic Order in Prussia.

The almost boundless amount of herring together with the special geography of the area was the foundation for the success. But the trials of time and the fluctuations of the herring stock put an end to the success.

The Scanian fairs and the Scanian herring fishery were a 500-year success story of Northern Europe.

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FISHING IN THE ÖRESUND AND THE JANUS FACE OF INDUSTRIALISM

Johan A. Lundin

In my historical research on the emergence of professional fishermen by the Öresund, I have studied a large corpus of material from the Swedish Agricultural Board's archives.¹ This consists of correspondence between the local fishermen, so-called fishing overseers and a state-appointed inspector of fisheries. The fishing overseers sent regular reports with statistical data from the 1870s onwards, containing records of boats, gear, catches, weather conditions, etc. Often they attached more freely written letters in which they reported on special conditions. In this article I give some examples from these sources that could be of interest for environmental historians. It is not my ambition to present new questions or research findings, rather to show the potential of the sources and inspire new research.

I take as my starting point the two largest fishing villages of southern Sweden around the turn of the century in 1900: Råå and Limhamn. As we shall see, these had different historical and structural conditions, so a comparison is interesting. After that I make a short presentation of the interaction of the state with the fisheries. Finally, the article ends with some examples from the records of relevance for further research in environmental history.

THE STATE AND THE FISHERIES

Back in the 1700s the Swedish state became interested in fisheries. There were paid premiums and subsidies to support technological innovation. During the 1800s the state began to collect statistics. This would be a base for the money paid in the form of aid and loans. Agricultural societies in the counties allocated monetary resources to the fishing villages. In 1864 a special fishery curator was appointed by the Royal Swedish Academy of Agriculture and Forestry in order to ensure that fishery statistics were established. He was replaced in 1890 by an inspector of fisheries at the newly formed Agricultural Board. At the local level fishing overseers, often fishermen themselves, collected the raw data.²

The fishing overseers collected data on fishing village's population, on different gear and their values, on different boats and their value, and the size of the catch and its value. In the first years reporting was done annually, but in 1894 monthly reports started. It was not unusual that letters were attached to the reports in which various problems of the fishermen were described.

RÅÅ – FISHING VILLAGE AND SEAPORT

In south-western Helsingborg, about five kilometres from the centre of the city, is the district of Råå. Råå used to be an independent municipality in the countryside, but was incorporated into the city in 1918.

Råå is an old fishing village dating from at least the 1500s. Here at the estuary of the Råå river was a natural port. A record from 1583 lists twenty-three fishing cabins at Råå. The land by the coast belonged to the Danish crown and permanent residence was not allowed. The fishing village therefore was a temporary settlement which was used by the farmers in the area during fishing seasons. When the province of Scania became Swedish in the middle of the seventeenth century, this changed and permanent residence was established at Råå.³

Those who erected houses on crown land had to pay fees to the state. After a while houses were also built upon land that belonged to the larger private landowners. The lease was often paid in herring delivered during the autumn months. It was a rather common practice in

this period that the larger landowners bought herring to the household by renting out beach land they barely used.⁴ In this way agriculture and fishery economies were linked together.

For the first sailors in Råå the estuary was a natural port. The entrance, however, was so shallow at certain times of the year that many fishermen moored their boats outside. The boats were therefore quite vulnerable to storms. In the mid-nineteenth century an expansion of the port started which would last in periods for sixty years. Shipping became more and more important for the local economy.

Industries such as shipyards grew up around the shipping. A large copper works that used the port for shipment was also built. The harbour was the local hub around which everything else in the community revolved. When the harbour was modernized, everything else changed, and vice versa. At the same time the harbour created a continuity of local community transition from a rural fishing village to a modern urban town.⁵

During the seventeenth and eighteenth centuries, only selected cities with special privileges had the right of shipping. People in rural communities were allowed to use their boats to transport goods between their own household and a nearby city, but nothing beyond that. Despite bans, people by the coast shipped and traded, but this was largely inaccessible to the authorities. Råå was notorious throughout the country as a centre for smuggling. This illegal activity was organized by merchants in Helsingborg who made agreements with their colleagues on the Danish side of the sound. Fishermen were hired to manage the risky journey. The restrictions decreased. Memorable years are 1775, when all the grain trade became free, and 1846 and 1864, when laws were passed on freedom of economic activity. After that the smuggling traffic slowed down significantly.⁶

The period 1830–1895 was the golden era of sailing shipping in Sweden. The great transformation of society with the commercialization of agriculture, population growth and industrialization called for increased communication opportunities. At the end of this period Helsingborg, which had previously had relatively insignificant shipping, grew to become Sweden's third city in terms of the number of vessels. In the nearby Råå shipping also grew.

In the 1830s there were only two ships used for commercial traffic. The restrictions were circumvented by those who brought the rural craft as so-called contingent citizens in nearby towns. This meant that they paid a certain fee to the city for the right to conduct their business.

It could also be that a citizen from the city was co-owner of a vessel from the countryside. In this way the smuggling and the shipping linked the fishing village's economy with trading houses in the city of Helsingborg.

The trade fleet of Råå grew as more and more vessels came into use. In 1903/1904 it consisted of 27 schooners, 6 barques and 2 ketches. The first steamboat had been sighted in the Sound in the late 1830s. However, it was not until 1870 that steamboat shipping companies were formed on a large scale.⁷

LIMHAMN: INDUSTRIAL COMMUNITY AND FISHING VILLAGE

In the south-west corner of Malmö is the district of Limhamn. Geographically it is at least partially a distinct part of the city. The area is around the cut of Öresund in the west and north and by the Öresund Link in the south. But there is also a historical reason why Limhamn of today is a city within the city: when it was incorporated into Malmö in 1915 Limhamn was a large town with 10,000 inhabitants.

The emergence of the town was closely linked to the Skånska Cement Company which established a large-scale cement industry in the 1870s. But lime mining had a longer tradition. The name Limhaffen (Limhamn), which means "lime harbour", is mentioned in several Danish documents from the sixteenth century, suggesting that there was already lime production in the area then. Until the industrial breakthrough this activity, however, was insignificant in relation to agriculture. Farmers in the area fished a little for subsistence.

After the enclosures in the early nineteenth century smallholders settled by the coast and became increasingly dependent on fishing for subsistence. However, it was only after the large industry was established during the late nineteenth century that a more or less professional corps of fishermen was established.

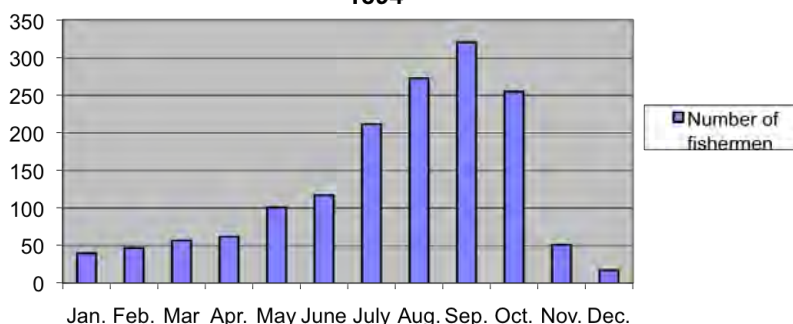
There was interdependence between the company and the fishermen. On the one hand, the fishermen were dependent on finding additional revenue in the industry, since herring catches could vary from year to year. On the other hand, the company had a labour pool available at temporary peaks in production. Interdependence is also visible

in the emergence of the port. The company needed a port and received large contributions from the state and agricultural societies by claiming that the facility benefited the fishing industry, which it certainly did. But it was not an equal relationship; through its economic capital and dominance in local politics the company held the power.⁸

SOME STATISTICAL EXAMPLES

The statistics on fisheries collected by the local fishing overseers may be of interest to environmental historians. This material has details that make it possible to study the extent of fishery over time. The statistical data shows that the fishery was highly seasonal during the late nineteenth century. Chart 1 show that the peak came during the period July to October. There was thus a rather long period during the year when sea life was left more or less undisturbed.

**Chart I: Number of fishermen in Limhamn by month
1894**

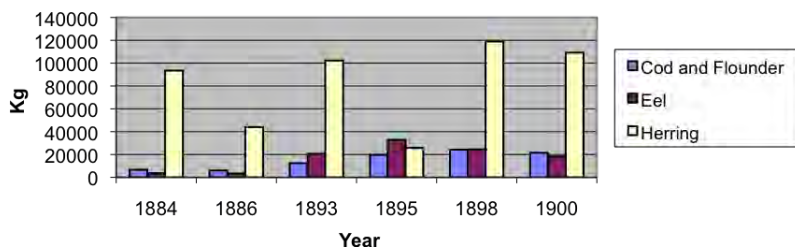


Source: Lantbruksstyrelsens arkiv, Fiskeribyrå med föregångare, fiskeristatistik och olika slag av fisken, H1B: 8-25. Riksarkivet Stockholm.

Looking at how much and what kind of fish was caught, we see that herring held a dominant position (Chart II). This meant that the years 1886 and 1895, when there was little herring, were disasters. In a letter from the fishing overseer Widerberg in Limhamn to the fisheries in-

spector from 1895 he reports that ten boats suspended herring fisheries as early as 1 October and started to put hooks on fishing lines again because “they could not feed on the herring fishery”.

**Chart II: Catch Value of Herring, Eel, Cod and Flounder
1884-1900**



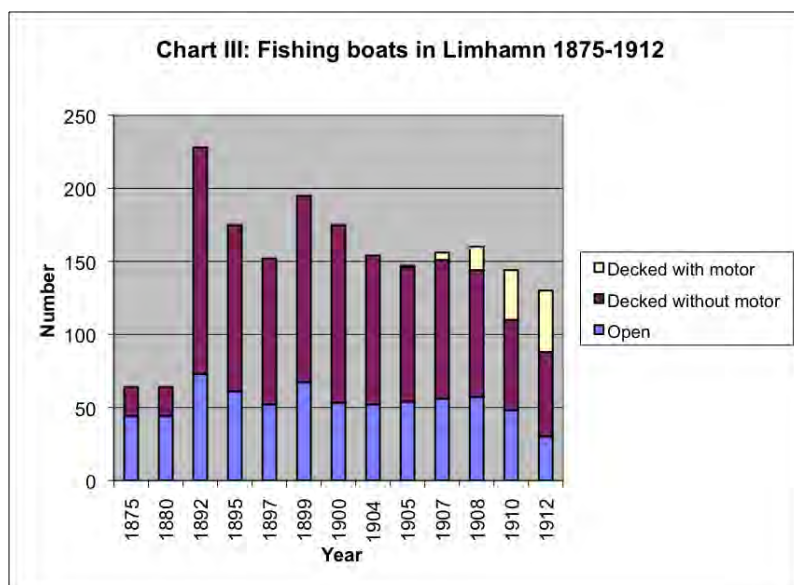
Source: Lantbruksstyrelsens arkiv, Fiskeribyrå med föregångare, fiskeristatistik och olika slag av fisken, H1B: 8-25. Riksarkivet Stockholm.

After the herring, eel, cod and different kinds of flounder were important catches for fishermen in Limhamn. In some years they also had good income from shrimps. Fishing for mackerel, garfish, crab and lobster also occurred but was not a major part of the gross income. The fishermen in Råå, who mainly caught herring and cod, also fished for plaice, turbot, sole, mackerel and eel.

Sometimes the fishermen had unexpected catches. The fishing overseer in Råå reported that on 23 November 1911 John Knutsson caught a blue shark, which measured 8 feet (2.5 metres).⁹ On the night between 27 and 28 September 1910 Severin Hansson and Oscar Nilsson from Limhamn caught a 100 kg swordfish. The fishing overseer Widerberg found that “the meat must be very good, it paid half a krona per kg”.¹⁰

Fishing was dependent on the weather, for better or worse. In the monthly reports from Råå in 1911 there are several examples. In February three boats were stuck in ice in the Kattegat for several days before being helped to Denmark by a German ship. The northerly winds and currents in September prevented the herring shoal from reaching Råå. In November the fishery suffered as a result of southerly hurricanes. “Surprising that the storm did not sweep everything away. The sea was so high that you could not see the poles for a long time,” wrote the fishing overseer Björk in his report.¹¹

The evolution of equipment and boats made the fishermen less dependent on weather and local conditions. The first fishermen used open flat-bottomed boats with two pairs of oars and a sail that could be raised when the wind allowed. Fishing was conducted near the coast and the boat was then placed on the meadows closest to their house. The use of decked boats was a major innovation that facilitated fishing on open seas with drift nets giving greater catches. Chart III shows that decked boats became more common between 1880 and 1892 in Limhamn.



There are no systematic statistics on the use of the *Kvass*, i.e. a fishing boat equipped with a sump. In a letter dated 10 August 1875 the fishery overseer Svärd in Råå informed of a visit to Sneckersten on Danish side of the Öresund. There he saw a model of a boat “which is built as a Kvass to have live fish in it”.

In the succeeding years Kvasses came into use in Råå. With a Kvass the fishermen did not have to deliver the fish immediately. They could be at sea for longer periods and also make longer trips. In January 1890, the fishing overseer Björk reported that Kvasses sailed to Læsø, Bornholm and Gotland. When the currents were right, fishing at Anholt was particularly successful.

The next major innovation was motorization. With an engine in the boat the fishermen were no longer dependent on the wind and currents. They could get around faster, and exploit fishing grounds further away. In the report for the month of May 1911, the fisheries overseer Widerberg noted that “during the month there has been very nice weather. Fishing has been carried out with perseverance and great energy, but it is the motor boats that are fishing the most.”



Fishermen and women in Limhamn around 1900

The manager of Skånska Cement, R.F. Berg, encouraged the motorization of fishing boats. He arranged for a major manufacturer of engines to exhibit in a marquee at the fishing port in Limhamn in 1904. In the statistical material the engine makes its entry in 1905, and in 1912 there were 42 deck boats equipped with engines.

THE STRUGGLE AGAINST OVERFISHING AND POLLUTION

But it was not just the weather that caused inconvenience. The systematic collection of statistics meant that the fishermen became more aware of fluctuation of fish over time. In his summary for the year 1902 Björk writes: "Fisheries variable, I cannot go into what the cause may be. I think the steamboat operation here in Öresund is responsible for much of the decline in fishery, and the seine nets take fry and small fish."¹²

Criticism of the seine nets recurs year after year. The fishing overseer went to Denmark to agitate against this form of catch, with little success because it gave good yield. Finally, a Swedish-Danish agreement was reached and seine nets were banned in the Öresund. The fishing overseer sent a letter on behalf of the fishermen in Råå expressing their "heartfelt thanks" to the fisheries inspector in Stockholm.¹³

Fishermen in Limhamn had similar problems. In a letter dated 23 April 1892 the fishing overseer appealed to the fisheries inspector for legislation against a kind of fyke net which took the small eels and threatened growth. This letter appears to have been heeded, for in February 1897 the overseer thanked the inspector for introducing a ban. Small eels, the overseer says, are too expensive to be thrown to the pigs.

Another problem was that the sand worm, which was an important cod bait, was about to disappear along the coast of Råå. Instead, the fishermen had to buy sand worms from Skagen in Denmark, which was quite expensive. The fishermen connected the disappearance of the sand worm to the effluence of dirty water from the copper works. In this case too the fishermen appear to have succeeded. In the annual report from 1907 it seems that the industry moved its tubes to a location further out in the stream.¹⁴

Very little has been written about the Öresund from the perspective of environmental history. This has nothing to do with the availability of sources. In the vast archival material that I have only superficially presented here, there are boundless opportunities. There are continuous statistical series allowing studies over time, but also an opportunity to study how the local fishermen managed the environmental problems they faced. Industrialism was a prerequisite for modern fishery, but it also had a darker side, such as overfishing and pollution. This is an interesting research field for those who are willing.

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THE FUTURE IS A SWEET DREAM

Sugar production in Scania c. 1800-1930

Fredrik Björk

...the commodities that feed, clothe, and shelter us are among our most basic connections to the natural world. If we wish to understand the ecological consequences of our own lives – if we wish to take political and moral responsibility for these consequences – we must reconstruct the linkages between the commodities of our economy and the resources of our ecosystem.¹

William Cronon

This text deals with the beet-sugar production breakthrough in Sweden and Denmark from c.1850 to the 1930s, arguably one of the most important factors behind the increasing industrialization of the human food supply in this part of the world. In Sweden, sugar was one of the first industrially produced foods, and it changed rather quickly from luxury to staple food. The sugar industry was considered as one of the worst industrial pollutants of its time, and was organized in a few, large companies. It also pioneered in using genetics and other sciences to increase production. All these aspects are relevant in the contemporary debate on food production, and looking at the development of Swedish sugar might be a useful way of understanding the processes that helped to shape the patterns of consumption and production that we have today.

In the nineteenth century, the consumption of sugar increased rapidly in many countries, in large part due to increased consumption of tea, coffee and cocoa.

The British consumption was by far the highest per capita in Europe, but towards the end of the century, consumption in several other

countries almost reached the British level. In Sweden, the annual per capita consumption of sugar increased from about 1,5 kilograms in the 1820s, to more than 20 kilograms by the turn of the century.² As a consequence sugar became one of the most important sources of energy in popular food. A few decades into the twentieth century it made up about one fifth of the total energy content. Some claimed that this was a natural process in all civilized countries,³ one aspect of how the increased wealth in societies led to greater expectations from life.⁴

THE EARLY YEARS

In 1812 the first successful attempt to make sugar from sugar beets was carried out in Sweden. The enterprise did not solely rely on the production of beet-sugar for its financial survival, but aimed for large-scale production of rum from molasses and waste products of the sugar production. When privately owned distilleries were prohibited, the business failed. Other attempts included potatoes and carrots as raw material for sugar production. Government agencies were indifferent to the demands for financial support in general, and the projects failed to materialize.⁵

In the 1850s, The Royal Swedish Academy for Agriculture and Forestry (KSLA) initiated a campaign to promote sugar beet cultivation. The production of beet-sugar was viewed as a means to improve the financial situation for farmers. This was to be done by encouraging a small-scale agrarian based sugar industry, owned by local farmers. KSLA's experimental growing of sugar beets, in order to improve size and sugar content, supported the propaganda. For the beet-sugar industry, the small size of sugar beets and their low sugar content had been a constant difficulty. But the results were not conclusive and the campaign did not lead to the establishment of a sugar-beet industry that could survive on its own. All of the beet-sugar enterprises that were initiated during this period failed except one: Skånska Sockerfabriken, located in the fast-growing industrial city of Landskrona.⁶

The company was formed in 1853, with most of the capital supplied by leading merchants and industrialists. It was evident that the necessary competence for beet-sugar production could not be found in Sweden, and German experts were hired. This was a common pheno-

mena of the Swedish beet-sugar industry in the latter part of the 19th century. Skånska Sockerfabriken planned to grow most of their sugar beets on farms operated by the company itself, a strategy that gave the company increased control over beet-growing conditions. To secure the volume and quality of beets grown by farmers outside of company control, beet-growing contracts were issued, in which the conditions for cultivation were stipulated. The company grew about sixty percent of the sugar beets needed for production at their own estate, Säbyholm, which was run as a model farm. At Säbyholm, chemical fertilizers were used extensively already in the 1850s, and experiments to optimize growing conditions were conducted. The results were then used to elaborate the contracts with sugar-beet farmers.⁷

For almost two decades, this was the only beet-sugar factory in Sweden. Production faced numerous problems, but the strong financial position of the company and close relations to important industrial and financial actors ensured the survival of the company.⁸

BREAKTHROUGH

In the early 1880s, the struggle between advocates of free trade and those who favoured protectionism entered a new phase. Agricultural exports to Britain deteriorated, and the Swedish parliament decided to adapt a more protectionist sugar policy. With the more protectionist sugar policy that manifested itself with the tariffs imposed on imported sugar from the 1880s, the incentive for beet-sugar production increased and new beet sugar enterprises grew out of nowhere. Between 1838 and 1881, thirteen sugar factories (sugar mills and refineries) were established. In the period up to the turn of the century another twenty-one were built, and in the year 1894 alone seven factories saw daylight for the first time. In fifteen years, almost all the sugar that was consumed in Sweden was beet-sugar. In 1870, only about ten percent of the sugar used in Swedish refineries had grown in Sweden, in 1895 more than ninety percent came from Swedish sources. The beet-sugar production increased from less than 1 000 tons in 1879, to 20 000 tons 1890. In 1896, production exceeded 100 000 tons.⁹

It is evident that we can see several changes in this period. In the early years of the nineteenth century the entrepreneurs worked on a

smaller scale and this was also the strategy that was promoted by KSLA in the mid-century. But when Skånska Sockerfabriks AB managed to sustain operations over a longer period of time, they had the support of important agricultural, industrial and merchant capital. One of the founders of this company, Frans Henrik Kockum, was a leading industrialist in southern Sweden. His company, Kockums, was one of the largest mechanical industries in southern Sweden, providing the rapidly growing railway network with railway carriages, among other things. Kockums soon also became a prominent producer of machinery for the Swedish sugar industry, with 1896 sales reaching nearly one million *kronor*. This integration of capital based in different contexts made the company strong financially, but in time also made the company a powerful political actor.¹⁰

There were also differences in scale. Some of the sugar refineries that operated up to the 1850s had a more artisan structure and it was not uncommon to use animals as power sources. In 1912, most sugar refineries in Sweden had more than 300 workers employed on an annual average basis, while the sugar mills averaging about 100 workers annually could have their work force expanded to more than 400 at harvest time. Animals were now replaced by steam as the main power source.¹¹

ENERGY AND FERTILIZER

For the early beet sugar industry, the low sugar content of the beets was a major problem. For this, the industry mostly blamed the farmers. To achieve a sugar beet that met the requirements of the modern food industry of the 1880s, it was not enough to use traditional methods. The land needed more thorough cultivation and weeding to prevent the slender plants from withering away. More work had to be invested in agriculture if the growing of sugar beets was to be successful, a fact that named the sugar-beet “The farmers disciplinarian”. But most of all, the sugar-beets needed fertilizer. From 1880 to 1895, the import of chemical fertilizers quadrupled, and nowhere was the use more widespread than in Malmöhus (the south-western part of Scania), where about three quarters of the Swedish sugar beets were grown. Here the use of chemical fertilizers was almost double the Swedish average at

the beginning of the twentieth century.¹² Manure was of course still used commonly to grow sugar beets, but the contracts with sugar beet farmers expressively forbid the use of *pudrett*, at the time the most common form of fertilizer of human origin.¹³

The production of beet-sugar also placed high demands on the transport system, thanks to the large amount of raw materials that was used in the industrial process, not only sugar beets, but also significant amounts of lime and coal. For every pound of sugar that was produced in 1875, up to four pounds of coal were used in the factories. Although the development of the production process and the substitution of coal with electricity for some uses led to a significant reduction in the demand for coal, the 1930 beet-sugar production of 188 000 tons demanded almost 100 000 tons of coal.¹⁴ The expansion of the railway system thus became of great importance for the beet-sugar industry, and new factories were either localized in the proximity of existing railways, or else a new railway was built. More often than not, they were also operated by the beet-sugar industry. By the turn of the century, Scania probably had the densest railway network in northern Europe, largely thanks to the booming beet-sugar industry.¹⁵

'A CHAPTER IN THE HISTORY OF ROBBERY'

In 1913 Gustaf Möller published a pamphlet that criticized the sugar industry and their contemporary political allies. The subtitle, "A chapter in the history of robbery", indicates how the sugar industry is portrayed in this text.¹⁶ At the time, Möller was a leading young social democrat, mostly active in the publishing activities of the party. In the early years he wrote in the influential newspapers *Arbetet* and *Skånska Socialdemokraten*, and went on to become manager of the party's publishing house, *Tiden*, in 1912. Later he was appointed minister for Health and Social Affairs four times between 1924 and 1951 and has been described as one of the foremost social democratic leaders and ideologists in Sweden.¹⁷

Harsh language between social democrats and the representatives of monopoly capitalism was certainly not very spectacular in the early 20th century. But behind the rhetoric was a critique that had a much wider support.

Fear of falling prices as a result of the rapidly increasing production in the 1890s led to the forming of a cartel that contained almost the entire Swedish sugar industry. In 1907 this cartel was transformed into SSA (Svenska sockerfabriks aktiebolaget) and accounted for ninety-seven per cent of the Swedish sugar production.¹⁸

The critique that was directed at the sugar industry focused on the huge profits of SSA. In the early decades of the twentieth century there was a significant interest in "the social question" and in 1912 *Socialstyrelsen* (The national board for welfare) was created. The cost of living was one of the major issues, and to investigate these was one of the first tasks for the new organisation. But it was not the cost of living in general that was in focus – it was the cost of living for the working class and their families. Earlier on, studies of this kind had been made locally – in Stockholm, and in other countries such as Austria and Denmark. *Socialstyrelsen* referred to these earlier studies, and also used the Austrian matrix in the Swedish investigation.¹⁹ For Gustav Möller and the social democratic party, there was no reason to wait for the results of the investigation. The cost of living for Swedish workers was too high, and they had the only remedy: The reduction or total removal of tariffs on imported food is the only way that the cost of living can be forced down, Möller argued. The SSA was a primary target of the Social Democratic critique. Between 1907 and 1912 profits averaged close to 30 per cent on the capital stock, and the high tariffs ensured SSA an almost total monopoly.²⁰

But the sugar industry was not only in conflict at the consumer end – it also had trouble with its raw material suppliers. From 1899 the sugar beet farmers started to organise themselves locally, and in 1904 the organisations in Scania, which is the major beet-growing district in Sweden, merged into a more centralised, effective organisation. From now on the beet farmers organisation demanded that negotiations should be made with the organisation, and not with the individual farmer. When the political conflict on sugar tariffs 1912-1913 escalated²¹, the beet farmers refused to sign an agreement. In the end, pressure from the Social Democratic opposition to lower tariffs and from beet farmers as well as the sugar industry to keep them up, led to a compromise with only a small – symbolic – reduction in sugar tariffs. But the compromise included three conditions: 1) The sugar industry and the beet farmers should make a five year agreement, 2) The sugar industry was to guarantee that beet cultivation could continue in the districts that supplied the factories, 3) The sugar industry was not allowed to

compensate the lower tariff with higher consumer prices; most of the financial consequences was to fall on the sugar industry, but beet farmers was also to take some of the cost.²²

In Sweden, the intercourse between politics and sugar had variations in structure and intensity from the 1830s and on. But from the beginning of the twentieth century relations became closer. One sign of the importance that the industry allocated to politics is that when SSA was formed in 1907, company headquarters was placed in Stockholm, hundreds of kilometers from Scania, where the company had its major operations.²³ After the 1913 compromise, the Swedish government from now on would be an ever-present actor in what we could call the sugar system – from cultivation to production and consumption. *Kartell- och trustredningen*,²⁴ the investigation where the original proposition for tariff cuts emanated from, had some ambition to look at cultivation as well as production. Consumption was not in focus here, but it had a silent presence. From now on there would be numerous public investigations (*Statens offentliga utredningar, SOU*) about sugar – regarding all three of these aspects.²⁵

When formed, SSA was Sweden's largest company, both in the numbers employed and in production value. Sugar beet growing employed c.100 000 labourers, and seasonal labour migration to the sugar-beet districts was common. This was needed to keep up with the rising demand for sugar, which by the 1930s reached about 50 kilograms per capita.²⁶

SUGAR AND SCIENCE

One way to control nature, of course, was to buy it. But to control the natural processes that influenced the size and sugar content of the sugar beet, was something completely different. In early years of the twentieth century, SSA set up an experimental station at Säbyholm sugar factory, in order to produce a sugar-beet variety that met the industrial requirements. From the very beginning, the work was done according to modern scientific principles, and genetic research became an important part of the company's effort to raise yields. The sugar-beet variety that this research resulted in was smaller in size, but had considerable higher sugar content.²⁷

But science also played a role in defining the changing social and cultural meaning of sugar. The narrative of the transformation of sugar from luxury to staple food was a cornerstone of the sugar industry's propaganda. In this narrative, science and technology played vital roles in what was described as "the refinement of nature",²⁸ and the fact that sugar was an industrial product was emphasized in the advertisements.

The very idea to use beets as raw material for sugar production had from the beginning strong links to the scientific community. In 1812 Carl Agardh wrote the first dissertation in Swedish where the production of sugar from beets was discussed. In this text, Agardh not only had the industrial procedures in focus, but also had something to say about beet cultivation.²⁹

Further on in the nineteenth century, scientists linked to the Royal Academy for Agriculture were engaged in promoting the cultivation of sugar beets, as well as conducting experiments to find the optimum conditions for beet cultivation. The arguments for beet cultivation were also to some extent linked to agricultural chemistry. Alexander Müller, one of the first agricultural chemists in Sweden³⁰, argued that the substances that were extracted from the beets in the industrial process were the kind of nutrients that the beets collected from the atmosphere: carbon, hydrogen and oxygen. Nitrogen and minerals were also needed in the fertilizer that was required, for sure, but these were later retrieved from the industrial waste, since these elements were not found in the refined product. In this way, Müller argued, both the farmers and the industrialists could make a profit from the land without reducing its productive capacity.³¹

As mentioned earlier, the low sugar content of the beets was considered to be a major problem by the sugar industry. Apart from blaming the farmers, some blame was also put on the seeds. Almost all seeds were purchased from Germany, and, argued the sugar industry, adapted to European continental climate. Already in the very first years of the 20th century, some experiments were conducted at Säbyholm sugar factory, just outside of Landskrona. Soon, however, it was transferred to nearby Hilleshög, where it became more firmly institutionalized, especially after 1912. As manager, the Dutch chemist Claes Tjebbes was hired. With some intermissions, he led the institution up to his death in 1935. From the very beginning, the work was conducted according to scientific methods and the strains that WWI put on the sugar industry highlighted the need for domestic production of seeds.³²

From the early 1920s, the seeds that were produced at Hilleshög covered the national demand and the work focused on producing a variety that to a greater extent was adapted to Swedish climate, and with a higher percentage of sugar. In 1928 the new beet variety, "Hilleshög", was ready for large scale cultivation. Not far from Hilleshög, seeds were also produced by a competing institution in Svalöv. The director here, the well-known genetic scientist Herman Nilsson-Ehle, argued that only domestic seeds should be used in Swedish beet cultivation. It has been argued that this argumentation also served to gain the breakthrough of the "Hilleshög" variety. Though this variety had been made for the Swedish climate, it actually had some success abroad and SSA created a foreign branch to supply these markets with seeds.³³

Genetics was a new science to be used by the sugar industry, but it was not the only one. Agricultural science had a considerable importance for the beet sugar breakthrough in the 19th century, and achieved new importance in the early 1920s. The reason for this action was an ambition to be able to predict the beet harvest more accurately. In the annual reports of SSA in the late 1910s and early 1920s the frustration that harvests are so difficult to predict is clearly evident. Also, in the years from 1915 to 1920 the beet harvest in tons per hectare was falling continuously. Something had to be done, and this led to that the biologist and botanist Olof Arrhenius was hired in 1923 to organise soil surveys of the soils cultivated by the farmers.³⁴

The composition of the soil had for many years been known to influence the size and sugar content of the sugar-beet, and considerable research had been done in this field. Arrhenius was of the opinion that the nitrogen, calcium and phosphate content of the soil were crucial in determining the size and sugar content of the sugar beets. But experiments also showed that this was only true to a certain level, so the addition of chemical fertilizers with high phosphate content was only effective to a certain degree. Since the use of chemical fertilizers were considerable in sugar-beet farming, and represented a significant part of the production costs, this was an issue that needed to be addressed.³⁵

At first, a preliminary survey dealt only with the pH of the soil, but in time it was found necessary to investigate other factors. As a result of this, a special survey of all beet soils in Scania was decided upon, dealing with soil-reaction, the content of soluble phosphoric acid, the nitrate production and finally the chlorine content. The survey covered a vast area – almost half a million hectares – and the samples were taken to a new laboratory in Staffanstorp. The results of the phosphate survey

were finally published in a "phosphate-map" over Scania.³⁶ For the scientists, the background of the considerable variation of phosphate content and the link to human activity was evident

Man has been able to change the phosphate content of the soil very considerably. During the stone age, fishing and hunting was his chief means of living. All waste, bones especially, remained around and in the huts, and in this way the soil became very rich in phosphates... Later on, when man turned farmer, this concentration of nutrients was carried out on a much greater scale and more intensively.³⁷

The results of the survey were distributed to the farmers with instructions where and how to apply the phosphate fertilizer and could also be used to examine areas where the harvests were either especially high or especially low.³⁸

This marked the beginning of a strategy that was based on the distribution of scientific results from SSA to the farmers. A serial publication, called *Odlarmeddelanden* was used as a vehicle for this transfer of scientific knowledge. It was distributed to all farmers who were cultivating beets on contract with SSA.

From the early 1920s, beet inspectors were hired to collect statistical data on the beet cultivation, such as the amount of fertilizers that were applied, drainage etc. To facilitate the compilation of these data, a special department was created, *Sockerbolagets statistiska byrå*, that worked closely together with the central laboratory at Staffanstorp.³⁹

THE POLITICS OF SUGAR 1914-1932

As mentioned earlier, sugar became an important political issue from the 1913 agreement on. A tentative periodization of the period from 1914-1940 could look something like this: 1914-1922 State regulation (War economy), 1922-1932 Stagnation and conflict

Obviously, Swedish sugar politics is a vast subject. For this reason, I will in this text make a few comments on the sugar politics that were more or less directly related to beet cultivation.

When WWI hit Europe, the sugar industry initially seemed to be in a favourable situation. By using mostly domestic raw materials, the perils of war were not threatening for the sugar industry. There was

one exception, however. Coal was used in great quantities by the sugar industry, and domestic resources were scarce. In order to maintain the level of production, SSA made the Swedish government make arrangements in London, to secure the level of Swedish sugar production. But there were more to come. In the years before the war beet harvests were larger than predicted, and SSA actually applied for permission to export sugar to Norway in 1915, calculating with a large surplus. But the 1915 harvest failed, and the warehouses were quickly emptied. The hardships with coal availability as well as rising prices for farm labour led to rapid reduction of sugar production in 1917. Already in november 1916, the government had initiated sugar rationing, and the falling production in 1917 made the government intervene, creating a stable state-guaranteed agreement where the price of beets as well as the price of retail sugar was fixed. This regulation continued until 1922, and led to an increase in the area used for sugar cultivation.⁴⁰

The period from 1922 to the next sugar regulation, in 1932, was filled with conflicts and uncertainty. SSAs uncompromising policies of reducing their raw material cost led to continuous conflicts. Both in 1922 and in 1926 the beet farmers and SSA were unable to make agreements, and in the conflict 1926 almost no beets were cultivated in Sweden.⁴¹

This continued until the 1932 sugar regulation, where among other things the price of sugar beets, minimum wages for farm labour and the price of retail sugar was to be fixed in yearly negotiations between the government and the sugar industry. Even though the Social Democrats in opposition opposed it, this regulation can be seen as a precursor to the 1933 "horse-trade" (actually in Swedish *Kohandel* – Cow-trade) agreement where the agricultural crisis as well as the high unemployment were addressed. The *Kohandel* was a major political deal between the Social Democrats and the Agrarian Party. The leading negotiator for the Agrarian Party, Bramstorp, was also chairman of the Scanian sugar-beet farmers organisation and had been instrumental in creating the 1932 sugar regulation.⁴²

CONSUMING SUGAR

1934 a booklet called *Sugar – our most inexpensive food* was distributed in secondary schools. Written by Iwan Bolin, who was a chemist and had written books on nutrition, the booklet was published by SSA and reprinted several times in large editions. "Sugar makes it possible for us to absorb the sun's life-giving powers in a convenient way",⁴³ Bolin argued. The booklet also carried such headlines as "How to economize by increasing your consumption of sugar"⁴⁴ and "Sugar dose not harm your teeth".⁴⁵ But there would be trouble in paradise.

SSA marketing manager Ståhlbrandt had to inform the board that attacks were aimed at sugar by the Swedish health and sports association, and above all, by its foremost speaker, Are Waerland. "Their attitude is altogether negative and concludes in a categorical appeal to cut down the consumption of sugar."⁴⁶ Ståhlbrandt considered Waerland and his movement to be a real threat to the sugar industry, since "They are many thousands...large numbers of young people have rallied to the support of the movement."⁴⁷

In 1938 Are Waerland published *Death to the white sugar, life to the white peoples*,⁴⁸ a booklet that argued for a drastic cut in the consumption of sugar, arguing that the sugar produced by the modern food industry was a "witches brew made by chemists"⁴⁹ and a driving force in "the funeral march of civilization"⁵⁰. Arguing that industrialization and commercialization had now completely taken control over food production, he predicted the ruin of what he called *our Nordic peoples*. Refined sugar also, Waerland argued, leads to depression, desire for unnatural stimulants and unsound pleasures. Several editions of this text were printed, and a translation into Norwegian was done. Waerland anticipated a "giant struggle...[between]... truth and capital ...[that will]... shake all civilized societies in their foundation."⁵¹

One of the principal targets for Waerlands critique were the scientists that worked for the food industry. According to Waerland, they lacked the ability to think other than in scientific terms and had become financially dependent of the industry – a critique that was pointed straight at Bolin. But Waerland was not entirely out of sympathy for scientists; all his arguments were actually based on statements by scientists, mostly medical doctors – a fact he also emphasized.⁵²

Bolin's brochure was used as the pedagogic framework for the 1938 production of *Sockerskrinet* (The sugar case), one of the most impressive propaganda achievements of the Swedish sugar industry.

This full-length movie mixed documentary scenes from the beet sugar production process with fiction; A romantic story of a newly married couple, who decides to study the Swedish beet sugar production on their honeymoon. The screenplay was written by experienced authors, well-known actors played the leading parts, and the movie became an improbable success. Over a period of five years, more than half a million Swedes saw the movie.⁵³

SWEET DREAMS

During the period discussed in this text, profound changes in the social, economical and ecological relations took place. The development of new technical processes, an expansion of the communication system and the introduction of fossil fuels triggered the breakthrough of beet-sugar.

Due to the large amounts of energy that was needed in the industrial process, it was necessary that energy was not only readily available, but also that it was cheap. The resulting product, sugar, was also cheap. It was so cheap, that it was the cheapest source of energy in food, from the beginning of the twentieth century. But the total energy content of the sugar produced was of course much less than the amount of energy that, mostly in the form of coal, was used in the industrial process. The major part of this energy came out of the process as heat. In fact, the sugar factories in Sweden were considered environmental problems as early as the beginning of the twentieth century, since the large amounts of cooling water dispersed caused widespread death of fish.⁵⁴

In 1924, SSA complained of the difficulties in predicting the sugar-beet harvest, as well as the sugar consumption. But they did not give up trying. The use of science to control natural processes became important and was fundamental to a company that looked upon itself as modern and progressive. In the 1920s, beet-sugar was marketed as “one of the purest products, that Swedish industry can manufacture.”⁵⁵ Science, and belief in the future, was important parts of the sugar industry’s production strategy, as well as the narrative that encompassed the sugar that was put on the market.

NOTES

- 1 William Cronon, *Natures Metropolis: Chicago and the Great West*, New York and London 1991, p. xvii.
- 2 LaLu, SSA Archives, F6:13, Report on the beet-sugar industry 1873/74 and 1874/75 to the ministry of finance, by Överkontrollör Billgren, F2E:1, Background material for the official report on the sugar industry 1913.
- 3 *Skånska Korrespondenten*, 29 oct. 1838.
- 4 H.L.O. Winberg, "Betsockerindustrien", *Skrifter utgivna av de skånska hushållningssällskapen med anledning av deras hundraårsjubileum 1914*. X, 4. *Industrigrenar som beröra jordbruket*, Lund 1920, p.9-11,
- 5 LaLu, SSA Archives, F6:14, Eilif Sylwan, *Den svenska betsockerindustrien I. Före Svenska Sockerfabriks Aktiebolagets bildande 1907*. Malmö 1932, p.23-25.
- 6 Erland Mårald, *Jordens kretslopp. Lantbruket, staden och den kemiska vetenskapen 1840–1910*. Umeå 2000, p.205-207, Sylwan, p.133.
- 7 LaLu, SSA Archives, F6:14, Jean-Paul Darphin, *Sockerets katedraler. En studie av sockerindustrins historia och arkitektur*. Stockholm 1994, p.176-178; Sylwan, p.77-79, 86-89, 99-100, 138-146, Jan Kuuse, *SSA Cardo 1907-1982*. Malmö 1982, p.27–31, Arvid Zachrisson, *Gödsling och jordförbättring i Skåne från 1800-talets början till nuvarande tid*, Lund 1914, p.22-23.
- 8 The fact that a beet-sugar factory could operate in Sweden, was used as an argument to promote the Danish beet-sugar industry. In the 1870s and 1880s, Danish beet-sugar production grew, and favoured labour migration from Sweden. On Lolland-Falster, Swedish "roepiger" made up a significant part of the work force and at the beet-sugar factory in Nykøbing, one fifth of the work force were Swedes in 1884. P. P. Svestrup and Richard Willerslev, *Den danske sukkerhandels og sukkerproduktions historie*, København 1945, p.#, Richard Willerslev, *Den glemte indvandring. Den svenske indvandring til Danmark 1850-1914*, København 1983.
- 9 Sylwan, p.167-170, LuLa, SSA Archive, F2E:1, Internal production statistics.
- 10 Lars Berggren, *Ångvisslan och brickornas värld. Om arbete och facklig organisering vid Kockums Mekaniska Verkstad och Carl Lunds fabrik i Malmö 1840-1905*. Malmö 1991, p.59-63. There were also involvement on a local political level. In Landskrona, when he was director of Skånska Sockerfabriks Aktiebolaget, Carl Tranchell was chairman of the city council from 1901 to 1905. See also Lars I. Andersson, *Tradition och förändring : Den skånska högern i dess borgerliga omgivning 1928-1936*, Uppsala 2003.
- 11 *Kartell- och trustutredningen. I*, Stockholm 1913.
- 12 RALu, SSA Archives, F7AA:3.

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ENVIRONMENTAL AGENCY

Forest histories from Denmark, c. 1500–2000

Bo Fritzbøger

Nature and society are not two distinctive extremes but a single and identical production of society-natures, of collectives.¹

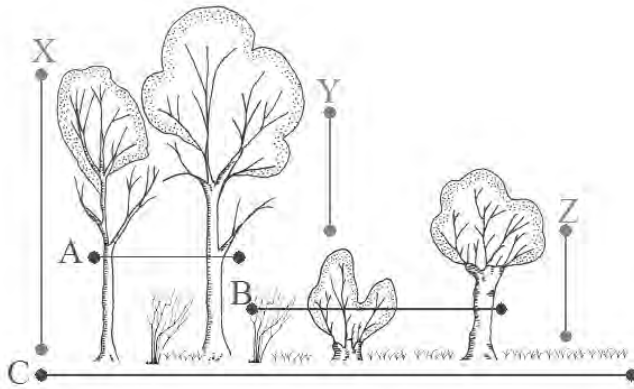
Bruno Latour

WOODS IN THE NATURE-CULTURE DIVIDE

Even though the meaning and impact of “environmental history” has been discussed for decades, it must still be permitted to start off with a personal credo: environmental history – rather than being a special historical *sub-item* – is a *perspective* that acknowledges the physical environment as a historical actor equal to Man. Although humans both form and are formed by the environment, it is, all in all, futile to separate the two. Their historical interdependence appears to have the form of an ever-changing network.² And although the flows of this network certainly contain very tangible substances such as chemicals and energy, meaning is not the least important kind of connection.³

The following pages will present a few examples from the forest history of Denmark of meanings implied by or ascribed to woods.⁴ However, first it should be noted that the modern history of Danish woods follows common trends in Northern Europe. In the long-term perspective, a period of significant deforestation was followed from the nineteenth century by forest conservation and afforestation.⁵ In 1780 the relative woodland acreage was approximately 7 per cent, fifty

years later it was about 3, and today it has reached 12 in an upward movement. More recently, a transition has been taking place from one-sided wood production to a state of post-productive multifunctionality while timber needs are met by Third World imports. So, deforestation is today diversified and globalized.



1. Two dimensions of common rights to use woods in late medieval and early modern Denmark

A) Common use of overwood trees among neighbouring landlords was normally terminated before 1600. B) Common peasant management of underwood as coppice appears to have been widespread. C) Common pasture – whether in forests or not – characterised the entire period before the late eighteenth-century land reforms. Y+Z) Commonage between a landlord owning the overwood and tenants possessing underwood or pasture was the customary arrangement of feudal woodland ownership. Z) In some cases, tenants even held pasture rights in enclosed underwood parcels belonging to others.

LATE-MEDIEVAL UNDERWOOD-OVERWOOD DISCORDS

Mainly due to differences in natural geography, the woodland of Denmark has been unevenly distributed since prehistory.⁶ Large woods were located only in the islands and eastern Jutland, whereas central and western Jutland was dominated by extensive moors. Except for minor

local patches of Scotch pine, juniper and yew, deciduous species were totally dominant. All landscape types were further characterized by a high degree of multifunctionality. So, most wooded areas were used not solely for wood production but also e.g. for grazing, berry-picking, hunting and occasional arable farming.

This multifunctional land use was paralleled by very complex forms of woodland ownership.⁷ Most land was considered to be owned by clerical or noble landlords or the crown but only a minor part of it was employed as demesne lands. Hence, most natural resources were possessed and utilized by tenants who in return paid various sorts of dues in cash or kind to their masters.

As a direct result of the divided ownership of lords and peasants, the woods were also divided: at first, not by enclosure or other kinds of spatial delimitation but only according to tree sizes. During the fourteenth century, major timber and mast trees (mostly mature beech (*Fagus sylvatica* L.) and oak (*Quercus robur* and *Q. petraea* L.) trees, called overwood) were probably reserved for the landlords in order to safeguard their continued supplies, whereas their tenants were granted the use of all minor trees and bushes (called underwood). So, a kind of vertical common was established.

At the same time, a horizontal one existed as far as extensively used outfields were concerned. Here, pasture and wood cutting remained common for centuries and individual property was normally defined in terms of resource quotas. When, for instance, four landlords owned a wood in common each of them would normally only know how large a part of the overwood trees he was entitled to. This obviously encouraged deforestation, and by 1520 the crown decreed that all future cutting in such common woods should be suspended until enclosure of its overwood trees had taken place.

The vertical commonage between lord and peasant continued, but it did not serve its intended end very well. The lasting existence of overwood trees was based on the continued growth of underwood trees to maturity, but as long as the peasantry chose to manage it as coppice virtually no overwood reproduction could take place. And so a gradual transformation of most woods took place during the early modern period: from composites of tree species and ages towards still more homogeneous stands of underwood.

This is the main reason why the seventeenth and eighteenth centuries resounded with complaints about forest destruction and peasant vandalism. The landlords were simply losing the battle of the forest.

And so, clerics and other antagonists of “peasant irrationality” could declare that “In order to conserve and procreate the still existing woods it is my humble suggestion that as a principal means and *causa sine qua non* common rights should be abolished. For by doing so, an intrinsic carefulness will emerge and every honest man who knows what is his will have the opportunity to conserve and improve his forests.”⁸

Due to their material significance, trees and woods were heavily charged with social meaning in the Late Middle Ages. However, by their natural growth they came to counteract the definition of over-wood ownership established by legislators so that their social meaning was actually rephrased by the woods themselves.



2. The location of royal forest ranger cottages surrounding the extensive woodlands of Northern Zealand c. 1730.

It shows that not all cottages were situated in accordance with the Forest Act of 1710.

REACTIVE STATE INTERVENTION IN THE SEVENTEENTH CENTURY

Danish wood production was clearly diminishing during the early modern period and so was the woodland acreage, but not proportionally. The conversion from overwood to underwood resulted in a shortage of large timber rather than in general scarcity. And the timber shortage was counteracted by imports. Around 1600 all timber in the stocks of the naval shipyard in Copenhagen was e.g. from either Norway or the Baltic.⁹

So, the immaterial consequences of deforestation were, in fact, more comprehensive than the material ones. For the spectre of a future collapse of the wood supply naturally startled a society as fundamentally reliant on wood as that of the seventeenth century. The state felt obliged to intervene, but only some scattered legal provisions regarding forest legislation were issued until the introduction of absolute rule in 1660. For two reasons, this year must be considered crucial in Danish forest history. Firstly, the wars with Sweden in 1643–45 and 1657–60 resulted in the loss of those provinces east of the Sound that were characterized by extensive tracts of woodland (Scania, Halland, Blekinge and Gotland). Secondly, the young Danish absolutism exploited the situation to boost itself. As in other European states, forest guardianship became one of the most significant fields in which growing state power was employed locally.¹⁰

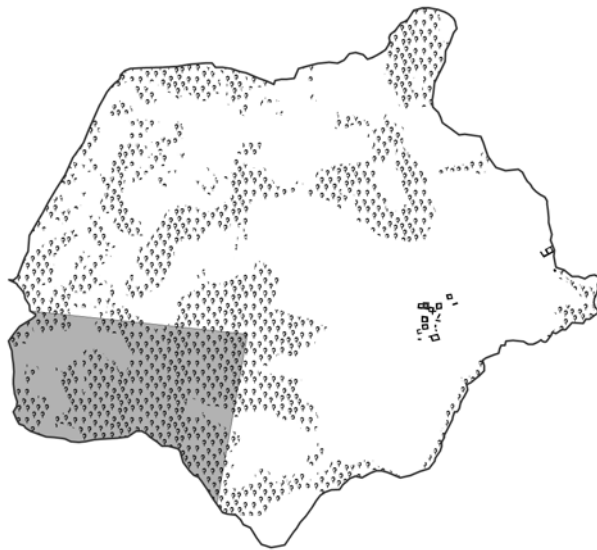
In the beginning, ordinary crown tenants were appointed to guard the royal forests as rangers but their supervision and silvicultural activity was mostly insignificant. In 1710, however, a new Forest Act introduced ordinary salaries to royal forest rangers who in return were to leave their village dwellings and move to new cottages built in their respective forest districts. In this way, they became the very first members of the peasant community to experience the spatial segregation that normally followed the late eighteenth-century enclosures.

The ranger held responsibility for silvicultural measures and monitored the peasant provisioning with fuel wood and timber as well as other types of cutting. It was among his primary obligations, however, to inspect and – as far as possible – prevent forest theft.

As in early modern Europe in general, forest theft was the most common of all unlawful activities. The vertical common between lord and peasant effectively blurred the limits of ownership and the possibilities to cut trees without due sanction were many. As a result,

the number of persons accused of forest theft during the seventeenth and eighteenth centuries was gigantic. In 1751, for instance, nearly 1000 peasants were convicted of forest theft in a county with about 1100 farms.¹¹ And the general view of the felons was one of indulgence rather than condemnation.

This was the setting in which forest rangers were to act. They were immediate, local representatives of restrictive forest laws that were hated by most. Transgressions were so common that virtually everybody was liable for punishment. But since large-scale law enforcement was impracticable, selective and - hence - arbitrary punishments prevailed.



3. Example of the spatial segregation of use rights implemented by forest enclosures in the late eighteenth and early nineteenth century.

The woods of the hamlet Lynge-Eskilstrup before (1770) and after (1816) enclosure and subsequent grubbing of underwood parcels. The grey contour in the south-west corner is the enclosed and conserved part of the village wood that still exists.

In 1726, for example, all villagers in Stavreby in southern Zealand were accused of excessive forest theft. They were all proven guilty, but if they were sentenced to jail and forced labour as law and custom prescribed the village would have been abandoned by the entire male population,

production would have stood still, and no rents could have been paid to the crown. So, in order to balance these clashing interests a random number of representatives was elected by choosing lots and punished.

This arbitrary legal practice of special forest courts established after 1710 and working closely together with royal forest guards was an important local display of absolute state power. So, the diminishing woodland acreage was given a very specific social meaning by an early modern state seeking to manifest itself.

EIGHTEENTH- AND EARLY NINETEENTH-CENTURY LANDSCAPE DISTINCTIONS

Clearly defined use rights and mono-functional land use were essential ingredients in the establishment of the possessive individualism that reformers believed would make states prosper. So, from around 1780 until 1830 most Danish woods were enclosed. Wherever multiple use rights had prevailed, these rights were now divided physically so that overwood owners gathered their rights in certain conglomerated parts of the former woodland area. These parts were normally located in the most densely growing areas of the wood. Underwood owners were granted coppice lots in its fringes and open grassland patches were legally defined as pasture.

In 1805 the seminal Forest Conservation Act prescribed, firstly, that all common woods should be enclosed within a period of ten years. Secondly, it required that all resulting overwood parcels should be fenced with stone or earth walls and conserved from grazing and browsing livestock. This process, however, was not ended until late in the century.

From general land hunger and advances of nineteenth-century technology, it followed that most peasant underwood parcels were soon turned into meadow or arable. Meanwhile a gradual transition from tenancy to freehold characterized the century, and after 1794 legislation supported the protection of privately owned lands against trespassers. So, from being a geographically peripheral but otherwise central part of traditional peasant economy, woods were *de facto* aristocratized during the nineteenth century.

Smallholders were largely dismissed in the process that redistributed hitherto composite forest ownerships. A similar development took place in many other parts of Europe. Karl Marx wrote about cottagers' deprivation of forest rights in Western Germany.¹² And woods served as the immediate reason for similar social conflicts in both France and Britain.¹³



4. Distribution of deciduous (left) and coniferous (right) forest acreage per municipality in the year 2000.

Data from the National Survey and Cadastre and Statistics Denmark.

In Denmark, poaching appears to have increased from virtual insignificance during the eighteenth century to a locally substantial problem in the late nineteenth century.¹⁴ But meanwhile forest theft – quite astonishingly – receded. In 1865 only five people in the entire kingdom were convicted, so apparently rural working-class interests were not totally ignored and woods did not turn into those symbols of social oppression and material deprivation that the rural masses experienced abroad. The head of the royal exchequer, Count Christian Ditlev Reventlow, proclaimed in 1794 that “all good inhabitants should consider the wood with delight and not as a source of coercion and crossness in which one cannot be seen without being punished”.¹⁵ And to some extent this appears to have been the actual outcome of enlightened absolutism.

On a more modest scale, however, enclosure and landscape sectorization *did* result in woods becoming emblems of aristocracy and upper-class country life. The vast majority of the people were now excluded from the forests, and this purely geographical exclusion had some significant social repercussions. Woods and forests were turned into arenas where professional forest officials reigned. And in everyday life it mattered little whether a local forest was owned by a nouveau-riche industrialist or by the state. Social distinctions continued to be expressed through landscape configuration, and even the state forests that dominated the vicinity of Copenhagen and made up one fourth of the national woodland acreage were not opened to the general public until 1917.

MODERN FORESTRY AND THE IDEA OF NATIONAL LANDSCAPES

The spatial segregation of woods resulting from enclosure and conservation facilitated a kind of monofunctional wood production that was far more productive than traditional forest use had been. German High Forest Management was introduced in the royal forests in the 1760s and during the following century various kinds of “modern forestry” spread in private estates as well.

In this process, the physical appearance of most woods changed dramatically. The density and timber quality of the trees increased, wetlands were drained off and uniform forest stands gradually replaced the ancient composite growths. Most important for the visual impact of this new forestry was, however, the introduction and dissemination of exotic tree species.

A number of late eighteenth-century landscape paintings display some surprisingly tall individuals of what appears to be Norway Spruce (*Picea abies* Karst.). In some instances, the trees are given an almost intrusively prominent position suggesting that they were considered as icons of novelty and progress. As indicators of landscape enlightenment, they fitted well in the alleged natural landscape gardens increasingly being established near royal castles, noble manors and bourgeois country houses during the late eighteenth century. However, these positive connotations of exotic conifers did not last long.

At first, Mountain Pine (*Pinus mugo*, L.) and Scotch Pine (*Pinus sylvestris* L.) were mostly planted on the sandy moorlands in central Jutland and in the plantations established to arrest the drifting sand dunes of the west coast. Gradually other species such as Norway Spruce made their way into both plantations and traditional forestry. So, whereas conifers had been practically non-existent until the 1760s, they covered 23 per cent of the total woodland acreage in 1881, and by the outbreak of World War I this share had doubled. During the first half of the twentieth century softwood production became a dominant feature in Danish forestry.

The quantitative success of conifers was based upon a mix of biology and economics. The hardy trees fitted the sandy soils and windy environment of the former moorlands far better than deciduous species. Further, their rapid growth minimized the investment period giving the species an economic advantage compared with deciduous trees. In the 1950s a prominent forestry professor consequently proclaimed that “in spite of uncertain future prospects the economy of conifers will always surpass that of broadleaves and the area with conifers should be extended as far as made possible by the biological conditions”.¹⁶

This still more purely utilitarian discourse, however, was never unchallenged. When romantic landscape painting peaked by the middle of the nineteenth century, the leading painters struck a clearly nationalistic note. Being considered non-Danish, conifers were in general omitted from their motifs.¹⁷ When nature conservation appeared on the political agenda by the turn of the century, it chiefly focused upon picturesque landscapes and the potential outdoor life of the growing working class. And in this connection the broadleaf-dominated park-like woods near Copenhagen served as an ideal.

The national properties attributed to beech became obvious when the Danish contribution to an international “garden of peace” in 1936 in Argentina was red clover and beech trees.¹⁸ Further, an alleged naturalness was mingled with the tree’s national qualities. As late as the 1980s a representative of the influential Danish Society for Nature Conservation remarked how “to walk among the elephant-grey columns [...] is a privilege bequeathed on us by the beech wood”.¹⁹ What most aesthetes neglected, however, was the fact that exactly this forest type dominated by scattered mature beech trees was also the ideal biological production machinery. The romantic beech woods of Eastern Denmark were no less materialistically utilitarian arenas than the spruce plantations in the west.

Since the 1980s, however, steeply rising wages and falling wood prices have caused increased mechanization and large-scale de-intensification of forestry. Like considerable parts of the rural landscape, woods have become more or less post-productive, and novel kinds of multifunctionality have been formulated and (to a certain degree) introduced. Among them are growing concerns for the ecological properties of the wooded landscapes.

As a reflection of commitments according to increasingly numerous international treaties, so-called natural forests are protected and promoted. Since 1992 official policies have promoted not only de-intensification of forestry but also protection of wetlands, areas with decaying trees, and other sources of future biological diversity.

The designated natural forest frequently appears as far less orderly landscapes than the classical beech woods, and it has been and still is quite a challenge for the state forest authorities to change people's aesthetic woodland preferences.²⁰ Simultaneously, new forest types are being constructed with great artistry. With the triple purpose of saving money, promoting dry-rot and creating a natural look, old trees or big branches threatening to turn over or fall down are regularly blown up instead of being sawed through. And unnatural species that actually thrive in their new environment and hence are considered intrusive, are removed.

So the old national woodland emblem of majestic beeches is gradually being replaced by dendrological discrimination: preferably, Danish woods should consist only of native species. Yet, this ideal remains far from realized. More than half of the Danish woodland area still consists of conifers. And, by the way, most beech trees propagated since the late nineteenth century have been of East and Central European provenance. Furthermore, these now designated as natural and indigenous.

WOODS AS ENVIRONMENTS AND AGENTS

Woods have always interacted with Man. Through history, the anthropogenic influence upon the cultural landscape has been immeasurable and so has *vice versa* its inescapable physical determinism regarding

human conditions of life and limits of action. The parties in this interaction, however, are so entangled that the simple traditional polarity of Man vs. Nature fails. It is not only a matter of reciprocal influence. In a chronological perspective, basically man-made woods of past generations materialize as a kind of new nature. And as existing or future realities woods are redefined in power plays that superficially could be described as *social* but in which the growing trees play their distinct and independent part.

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WHEN THE CEILING WAS BROKEN

Environmental History in Malmö 1820-1920

Per Eliasson

Can it not be said that there is a limit, a ceiling which restricts all human life, containing it within a frontier of varying outline, one which is hard to reach and harder still to cross? This is the border which in every age, even our own, separates the possible from the impossible, what can be done with a little effort from what cannot be done at all. In the past the borderline was imposed by inadequate food supplies, a population that was too big or too small for its resources, low productivity of labour, and the as yet slow progress in controlling nature.¹

Fernand Braudel

LIMITATIONS IN SPACE AND TIME

In pre-industrial society, the limitation of human energy conversion was twofold - it was limited in both space and in time. To convert heat into motion was impossible before the steam engine. With the exception of hydropower and wind power and all their limitations, energy could be converted into motion only by human and animal muscle power. Its limited efficiency however, made it necessary to concentrate a lot of people or animals within a smaller area in order to undertake energy-demanding

enterprises. It meant a restriction in space. Even if it had been possible to convert heat into motion, the availability of thermal energy would have still been limited by the photosynthesis of the plants that could be turned into fuel. Trees grow relatively slowly and may need to compete with other essential crops. Therefore the use of energy was limited in time. These two restrictions in space and time which had followed humankind throughout history were ended by the new steam engine technology and fossil fuels. The steam engine allows thermal energy to be converted into kinetic energy at a much higher level of efficiency than could be provided by muscle power. Even the first Newcomen engines, which had an efficiency of only one per cent, could do the job of 300 workers. This enabled mechanical energy to be concentrated in space. The new machines were fired by coal, the energy produced by the earth over millions of years of photosynthesis and stored as fossil fuel. This enabled a concentration of energy in time. When these historical limitations of place and time were annulled, it was the start of a new era. The ceiling was broken.

In Malmö, this change had greater importance than in most other Swedish cities. Two major energy transitions took place during the 100 years between 1820 and 1920. How did it change the city?



1. Woods in Scania in 1845.

Malmö in the southwestern corner.

Source: Forest map of Crown Prince Carl 1845 (detail).
State Archive.

MALMÖ – A PRE-INDUSTRIAL PRISONER OF ENERGY POVERTY

The growth of medieval Malmö, the name literally means “sand hill”, during the thirteenth century occurred for two main reasons. Firstly, due to its location just opposite the new city of Copenhagen on the other side of the Öresund, Malmö became a convenient landing place for the maritime traffic between Copenhagen and the old archbishopric in Lund.² Secondly it was a part of the herring market along the Öresund which was controlled by the Hanseatic League. During early autumn, the flat sand beaches were full of fishermen bringing their catches ashore and salting the herring in barrels. Malmö’s location can be said to depend more on the conditions in and around the Öresund than on the surrounding countryside. This fact has been the distinguishing feature of Malmö until the industrialization of the nineteenth century. This is particularly evident in relation to the supply of energy.

The energy conditions that existed in south-western Scania during pre-industrial times, or until the early 1800s, was more similar to those on the Continent, in countries such as Denmark, Germany, France or Britain, than in the rest of Sweden. The two other large Swedish cities of Gothenburg and Stockholm have both had access to fast-flowing water that has acted as an artery to a resource hinterland around a large lake upstream. It enabled the shipping of food and fuel, people and animals, raw materials and indeed materials of all kinds. The water currents were also able to provide access to power and receive all the pollution and human waste from a concentrated population. Moreover, the sea outside the two cities had major archipelagos that offered good conditions for maritime transport to the city. Malmö has certainly been surrounded by a rich agricultural landscape. However it was restricted to energy-demanding land transport. “We are in a city under siege,” said grain trader Kock in 1841 when the autumn rains turned the roads into a quagmire.³ The severe transport difficulties to the countryside did place constraints on the grain trade, which was the basis of Malmö’s exports during the first decades of the nineteenth century. However there was a further problem because unlike Stockholm and Gothenburg, the city lacked a natural port. It was first in the early 1800s that more extensive land reclamation was carried out in the port which enabled loading and unloading to take place directly at the quay. Without access to flowing water and the opportunities for transport to

a resource hinterland and in the absence of an archipelago and a natural port, Malmö was to a much greater extent than other Swedish cities, a prisoner of energy poverty.



2. The treeless landscape around Malmö in the beginning of the 19th Century.

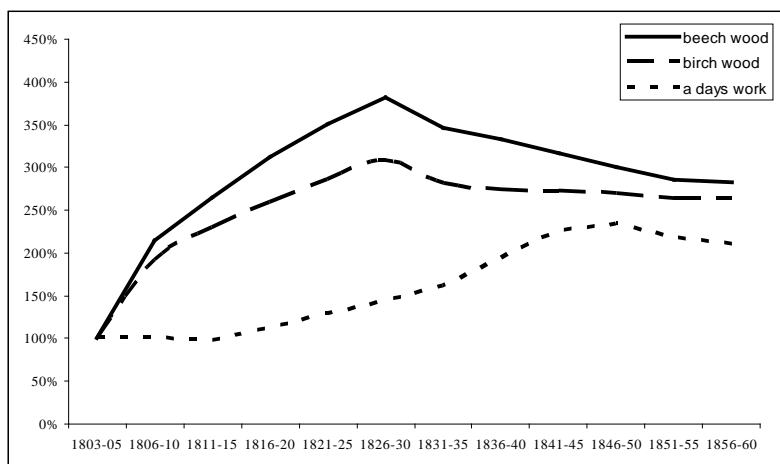
Drawing by Carl Stefan Bennet.

Source: UUB/Kart och Bild.

LACK OF WOOD, LACK OF ENERGY

On the request of the Swedish parliament, the eighteenth Century botanist, Carl Linnaeus made several journeys through Sweden in the 1740's in order to make an inventory of the country's nature resources. During his last journey in the summer of 1749, he came to Malmö and describes the surrounding landscape. "It had the most wonderful arable fields, as far as you could see, and it seemed as nothing was lacking except wood, which is expensive, while the peasants made extensive use of the peat bogs".⁴ The lack of wood for fuel resulting from Malmö's location is the most obvious difference in energy requirements. In March 1845, the vicar in the district south of Malmö answered in a questionnaire concerning the supply of wood. "Husie and W. Skreflinge

parishes (...) situated in Malmöhus county on the plains outside Malmö are rich in grain, but lack all kind of wood supplies.”⁵ However wood also had to compete with other land uses. In a statement made in the mid-nineteenth Century, a vicar in Bara judicial district put forward the following explanation: “Where woods are lacking, the soil is so good that it is used as cropland which gives much greater yields in grain than if it was overgrown by woods. (...) Lack of wood seems not to cause any discomfort to the people of the plains, who with greater joy looks on their fertile fields and croplands, than on the woods.”⁶ The peasants used peat as their primary fuel. This was also the case in Malmö. Ludvig Falkman, a distinguished land surveyor, remembers in his memoirs the lack of fuel in Malmö during his childhood at the beginning of the nineteenth century. “If the fuel was put in the iron oven from the kitchen side, it usually consisted of peat, but otherwise all tile stoves in older days were always fuelled with beech-wood and in later times with birch-wood and, as an exception, with coal, put on iron bars.”⁷ In this short quotation, we can follow the changing energy situation in Malmö throughout the 1800s. To burn peat was already very common in the 1700s. However the smoke and stench from burning peat made it a far worse fuel than fine beech-wood. When it didn’t matter so much, as in kitchens, the stoves were fired with peat but in fireplaces in rooms, beech-wood was used. The prices of both beech-wood and birch-wood rose sharply until the 1840s, significantly more than labour costs. At the beginning of the century, beech-wood was slightly more expensive than birch-wood. However in the 1820s and 1830s the price of beech-wood rose much faster than birch-wood which explains the transition to birch-wood in Malmö’s tile stoves. From the 1840s, however, the prices of both beech-wood and birch-wood began to decline and then to stabilize at a lower level.⁸ What was the reason for this fall in the price of wood?

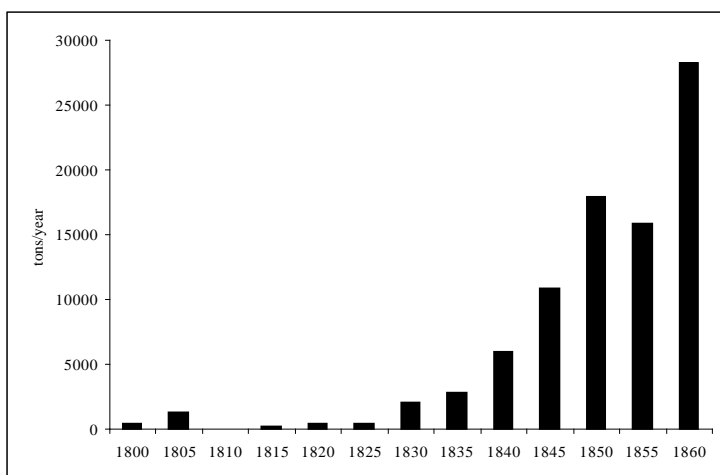


3. Wood prices and the cost of labour in Malmöhus county 1803-1860.

1803=100. Source: Jörberg 1972

SUBSTITUTION FOR WOOD BY COAL

The answer to the question regarding the fall in the price of wood can also be found in Falkmans's story. The first major coal imports from Britain arrived at the newly constructed port of Malmö. From the 1830s, Malmö became a major import harbour for British coal.⁹ As much as a quarter of Sweden's total coal imports passed through Malmö by the 1840s.¹⁰ That was considerably higher than Stockholm's share of coal imports.¹¹ The arrival of coal ended the energy poverty which had been the city's scourge. The pattern was the same as on the Continent and in Britain. In the first stage, coal was used as a substitute for wood and peat for heating in homes and in craftsmen's workshops. Secondly, coal literally fuelled an industrial revolution which penetrated the whole society. The use of this cheap and concentrated form of energy transmission led to the adoption of a series of new technologies.



4. Import of coal to Malmö harbour 1800-1860.

Source: Persson 1915.

While a shortage of wood for fuel resulted in the substitution and an increasing import of coal, things also started to change in the countryside. Since wood prices soared, especially for beech, by as much as four times in twenty years, the incentives for wood cultivation rose simultaneously. In the 1830s, large landed estates in Scania started to employ German and Danish foresters in order to introduce systematic forestry on their land.¹² The estates around Malmö were among the first. The estate of Skabersjö, very close to the city, had its first forest plan made in 1838 by the Danish state forester, Edvard Svanenskjöld. The existing forest on the property was typical for Scanian estates at that time and consisted mainly of old beech, oak and some small scattered stands of conifers. Beech forestry became very rewarding for the estates during the nineteenth century and the accounts show that producing wood, mainly beech for fuel, became increasingly profitable. Oak decreased in the Scanian estates and instead, with the cattle removed from the forests and planned selective felling in order to regulate the sunlight, the beech rejuvenated very well naturally. Pine and spruce were sown and planted on open former pasture land.¹³ The use of Danish state foresters in the Scanian estates during this period is mainly attributable to three factors. In Sweden, a forest institute was founded in 1828 offering state exams for foresters. Ho-

however this early Swedish state forestry concentrated on maximizing the amount of wood rather than profit.¹⁴ This question was the subject of debate in Denmark during the nineteenth century. In practice, however, the management of the forests became a compromise and the Danish foresters were used to produce under market conditions for economic goals.¹⁵ Secondly the Danish foresters also were accustomed to the natural conditions of beech forestry, which in Sweden almost exclusively took place in Scania. The third reason is that in Scania as in Denmark, wood production was mainly used for fuel rather than for timber or other purposes. In the questionnaire from 1845, previously mentioned, the vicar in Skabersjö parish pointed out 120 hectares of beech and 40 hectares of oak to be used as fuel, whereas only 10 hectares of oak and 10 hectares of conifers were used for timber.¹⁶ In 1878, in the Danish province of Jutland, over 90% of the beech forest was used for fuel as well as 75% of the oak forest. The corresponding figure for conifers was only 15-20%.¹⁷ The similarities are striking. Beech was fuel, oak was mostly fuel whereas conifers were used as timber or for other purposes, in Denmark as well as in Scania.

Did the introduction of forestry affect the energy balance in southern Scania? As one example shows, there was a marginal impact in the short run. By 1865 forestry had been introduced in about 40% of the woods in the Malmöhus county. If the annual cutting in these woods had been on the same scale as in Skabersjö, the energy content of this wood as fuel would have been less than one tenth of the energy content of the coal imports to Malmö in 1865.¹⁸ This shows the relative importance of the new fossil energy carrier.

A NEW HINTERLAND AND NEW CONNECTIONS

The railway was a dynamic part of the changes. The first part of the southern trunk line from Malmö, which only went to Lund, was opened in the autumn of 1856. One of the most important changes brought about by the availability of new energy was the total transformation of transport. Goods transported by horse and wagon could cover thirty kilometres in a single day. With the new trunk line to Stockholm,

goods could be transported up to 400 kilometres a day. Once train speeds were increased, goods were able to reach Stockholm in a day i.e. 600 kilometres away. Shortly before the First World War, Oslo, Hamburg and Berlin could be reached by a day's journey by train.¹⁹ The former resource hinterland, limited to a few kilometres radius due to the restrictions of land transport, was now increased dramatically in size. However it was not only places further away that could be reached in a limited time, the near hinterland was linked even closer to the city through an increasingly dense network of local and regional railways.



5. The new Central station in Malmö 1858.

Source: Malmö museum

When the Continental line to Trelleborg was inaugurated in 1898, no less than seven different railways started from Malmö. South-western Skåne belonged to Europe's densest rail areas at that time.²⁰ With this dense railway network and its port, Malmö became a real centre in southern Sweden. Coal, wool and fertilizers for agriculture were imported for use in the city or in the surrounding countryside. Cereals, cattle and butter went by rail for export to the Continent and Britain. Steam technology extended the city's near hinterland not only by facilitating land but also sea transport as well. One of the big advantages of railways was their punctuality and predictability, an important condition for industrial production. The same goes for steamships which

on short distances could follow a time-table as punctually as trains. As early as 1838, the first regular steamship started to traffic the Malmö-Copenhagen route. Soon small steamships were crisscrossing all over Öresund. They maintained their predominance until the railway was built along the coast on both sides. By that time, traffic over rather than along the Öresund had become more important. Competition became more intense. In 1874, a Danish shipping company bought all 12 competing steam vessels and established a monopoly which lasted until 1900 when a joint Danish-Swedish company - Öresund Steamship Company - was formed.²¹ At that time the problem of linking railways and steam ships together, the two steam-driven transport technologies on land and sea, had been solved in 1895 by the new steam ferry for railway traffic between Malmö and Copenhagen. This meant that Malmö's hinterland reached into Zealand as well as becoming a part of Copenhagen's greater hinterland.²² The deepening contacts over the sound became even closer and professional expertise, like the early example of the Danish foresters, came from Denmark to Scania. The largest groups of migrants from Sweden to Copenhagen were young women for house-work as well as craftsmen and male workers for seasonal work in construction and industry.²³ Many of them stayed in Denmark and between 1870 and 1901, the number of Swedes in Copenhagen rose from just over 4000 to 15 000 or four percent of the population.²⁴ Entrepreneurial initiatives, like the joint ferry company, as well as new political ideas increasingly spread over Öresund. The first socialist meeting in Sweden was for example held in Malmö on November 6, 1881 by August Palm, a Swedish tailor who had been working for years on the outskirts of Copenhagen. The expansion of the port, which started on a large scale during the mid-1800s, accelerated when the railway was built on a bank along the coast, linking land and sea together. The shallow beach that was previously Malmö's barrier against the outside world was now an asset, since land for new industrial sites and new parts of the port could easily be reclaimed.



6. Malmö port 1912.

The Central station to the right and on the left side of the port there are the coal quays with piles of coal everywhere.

Source: Malmö museum.

POPULATION GROWTH – AND A NEW LIMIT

Steam engine technology represented a revolution in transportation when the rich hinterland was opened and the expanded port and steamer traffic connected the city to the outside world. With imports of coal and raw materials and exports of food, Malmö began to grow. In order to see the dimensions of the change, we can examine how much energy that was imported to Malmö in a year, expressed as the same amount of wood energy. It can then be compared with the real growth in the Swedish forest.²⁵ If we start from the earliest reliable account of the forests, the 1920s National Forest Inventory, we can say that by 1915 the total energy content of coal imports, petroleum imports and the electricity produced by hydropower represented the annual growth of all the forests in the province of Scania (Malmöhus' and Kristianstad's counties), province of Blekinge and the county of Kronoberg together, or in all south-eastern Sweden.²⁶



7. Scania (Malmöhus & Kristianstads), Blekinge and Kronoberg.

The energy content of the annual wood production in the forests of south-eastern Sweden was similar to the energy at Malmö's disposal in 1912.

However the different energy carriers accounted for very unequal shares of total energy, where coal accounted for approximately 95%, petroleum 4.5% and electricity (hydropower) only 0.5%. Besides electricity, it is impossible to say how much of this energy that was used in Malmö. However in one way or another, it was placed at the city's disposal. This change in disposable energy being made available to a city struck harder by energy poverty than most other Swedish cities had consequences. Throughout the nineteenth century, Malmö had a higher population growth than both Stockholm and Gothenburg with the exception of the epidemic ridden 1880s.²⁷ The fastest growth occurred around 1900 when the population grew by 70% from 48 000 to 83 000 between 1890 and 1910. However the increased population was accompanied by new problems that were once again dependent on the city's location and natural con-

ditions. The absence of a large water artery had earlier meant problems with transport *to* the city. The problem now concerned what we wanted to carry out *from* the city: the pollution created by industrial expansion and the sewage water produced by the growing population. It was accumulated in shallow ditches around the inner city, originally between five and seven meters wide and only 60 to 120 centimetres deep, which were repeatedly widened and deepened. They were called the Canal.²⁸ Recurrent epidemics of dysentery took over 2 300 lives in 1882 alone, mostly in the poorer southern and eastern parts of the city. In a population of approximately 40 000, it means that more than one inhabitant of twenty died that year of dysentery. The 1880s were also the only decade during the 1800's when Malmö's population percentage growth did not exceed both Stockholm and Gothenburg. The availability of fossil energy and steam engine technology had made it possible to exceed the old limits of production, transportation and population growth. But now, a new frontier seemed to emerge, the biological frontier. It also appeared in the form of a transportation problem – to get fresh water in to the city and the waste water out from it.



8. Malmö in 1914. The inner city encircled by the shallow Canal.

Source: Malmö. En skildring i ord och bild av stadens utveckling och nuvarande tillstånd.

TOO LITTLE FRESH WATER, TOO MUCH SEWAGE WATER

The first Malmö that emerged during the early Middle Ages was a collection of houses on an elongated tombolo in Öresund, surrounded by shallow water on all sides except for some sand strips in the south and west. The conditions for deep wells with good fresh water were not particularly good. Therefore Malmö is one of the few cities among the Nordic countries which had, as early as the sixteenth century, a highly advanced water supply system. Fresh water was transported in a pipeline of pierced tree trunks from a dammed brook, one kilometre south of the city. The wooden water pipe system which started in 1587 was in use for almost three hundred years until 1862, when it was replaced by cast-iron pipes. A larger dam and a new water works were then built. A number of other small streams contributed to Malmö's fresh water supply.²⁹ However industry started to compete for the water resources and for example Malmö Yeast Factory was identified in 1898 as a major polluter. The town's medical officer gives a vivid picture of the problems with the yeast factory emissions in one of the streams that was used for fresh water supply.

Just east of the bridge, a ditch flows into the stream through which the yeast factory effluents are carried; water in this ditch has a gray and white opaque colour, which can be noticed far out in the currents. It has a strange, rather strong odour, reminiscent of yeast, sewage, etc., and its volume is comparatively great. Below this point, the confluence stream's appearance undergoes an extremely remarkable change. The water becomes opaque and immense masses of a gray, green loose, slimy substance collects around the water plants, which are in constant decay, emitting a strong, extremely disagreeable odour.³⁰

The supply of fresh water was a significant problem, aggravated by the city's industrialization. The groundwater wells that were drilled in 1901, down to 80 meters deep, ten kilometres south-east of Malmö, were an attempt to solve the problem. There is an underground water stream that goes up in a gully in the limestone rock and from it the water was pumped to the water works.³¹ The question of how to handle the rapidly increasing volumes of sewage water presented even greater problems than those posed by the need for fresh water. The dysentery epidemic 1881-1882 illustrated the vulnerability of the rapidly growing urban population. Since the city was located on a shallow sandy coast without a major river, all kinds of

water pollution ended up in the still water of the Canal, the broad ditch around the inner city. With all the waste water, the Canal soon became increasingly shallow and the bottom that consisted of thick layers of mud spread an appalling stench over the nearby neighbourhood at low tide. Here the problem became acute. The obvious solution was to conduct a real extensive broadening and deepening of the Canal and a better connection with the sea in order to improve water circulation. Between 1854 and 1859, the Canal was therefore widened to fifteen meters and deepened to over two meters. In order to improve circulation, a special outlet was built to the Sound, west of the city.³²

Other major polluters of the Canal's water were the city's tanneries, dye and food industries, starch factories and slaughterhouses. Industries were centralized in the city centre. One of the major polluters was the Malmö Wool Factory, which was located next to the Canal. The open ditches and gutters leading wastewater from these industries and residential buildings became an increasing problem. In the 1870s throughout the inner city, private sewage pipes began to be built, which ended in the surrounding Canal. A contributing factor to these private pipes was the introduction of water closets. The newly built hotel Kramer in 1887 was first to be equipped with water toilets. However installation of similar innovations in the new Malmö Wool Factory was banned by the Health Board.³³ On a map of a coordinated sewer system in 1880, it can be seen how the two large sewage pipes, one from the inner city and the other from the southern suburbs, end opposite each other in the southern Canal.³⁴ This was obviously not the way to solve the problem in the long run.

It was not until the turn of the century in 1900 with the expansion of a sewage system, the problems got solved. In April 1908, a sewage pumping station at Rosendal opened which pumped Malmö's sewage water several kilometres out into Öresund. The transport problem was solved, but in a way that pointed towards a new future for energy transitions. The five large pumps were not driven by steam engines but by electrical motors and with diesel engines for emergency power.³⁵



9. The southern Canal.

The main sewage pipes from the inner city and its southern suburb ended here before 1908. The Malmö Wool Factory, one of the biggest pollutants, is seen behind, its chimney to the left.
Source: Malmö museum.

ELECTRICITY – A NEW ENERGY CARRIER

If coal and steam opened up the hinterland of the city of Malmö, it was electricity and oil which opened up the world. They represent a new energy transition associated with electric light, electrical trams and electrification of industry as well as paraffin lamps, automobiles and diesel engines. As early as 1887, a company with a few small electric generators, powered by steam, had supplied electricity for illumination of the central parts of Malmö. Kockums, a large metal industry and shipyard, had already in the 1880s acquired their own steam driven electric generators. Another early user of electricity was Malmö Wool Factory. But in 1901 the new city-owned electricity plant stood ready. When it was built, it came to represent the actual turning point between two energy systems. Two steam boilers fired by coal, provided power for steam generators which produced electricity in DC. However when the power plant started in October 1901, capacity proved to be too low. When the horse trams were replaced by electric trams in 1906, new steam engines and generators expanded the plant. At the same time, however, the new solution for the city energy problems was introduced. A row of new hydropower stations were built along the nearest big river, Lagan, situated 100 kilometres north of Malmö. The mechanical energy from a large flow of running water that the city lacked could now be transferred using the new electromechanical technology. The problem of the large power losses in the transmission of electricity over long distances had been solved with the help of high-voltage AC power. This new energy carrier drove the electric pumps in Rosendals pumping station from 1909 and led the sewage water out into Öresund.³⁶ It was the three-phase high voltage power from the hydro electrical stations at Lagan which ran the engines in all the city's major industries and transformed the city by providing electric light in homes and in the streets. When wolfram lamps replaced carbon-filament bulbs, power consumption was reduced to one third and electric light became, if not cheap, so at least affordable for all. During the following decade, Malmö was electrified and in 1920, 73% of the town's apartments had access to electric light.³⁷



10. The steam-driven power plant in 1901.

Source: Malmö museum.

PARAFFIN OIL AND PETROL

The second component of the new development block that was introduced at the turn of the century is what the port statistics call, "petroleum products". Gas light, a part of coal technology, was in Malmö first used in large-scale street lighting and in homes from the 1850s. Its major disadvantages are that it is pipe-bound and stationary. Outside the pipe systems, it was no alternative to wood, oil lamps or candles. The use of paraffin oil refined from mineral oil or petroleum provided a strong and relatively safe form of lighting almost everywhere. The demand for paraffin oil rose rapidly with industrialization as did refinery capacity. The volatile and inflammable petrol was only a dangerous by-product of refining paraffin oil. However it soon became a primary product once the internal combustion engine was introduced. In Malmö, imports of paraffin oil were a matter for the wholesale trade in colonial goods. Indeed it was within these entrepreneurial circles that the first major oil company was formed in 1896, Sydsvenska Petroleum AB. Not surprisingly, the initiative once again came from the Danish firm that had the agency for the Rockefeller's Standard Oil. It was a direct result of the new method of transporting oil in bulk, i.e. in large tanks on ship and by rail, instead of in barrels. This form of transport required a lot of cisterns in the ports and an expanded supply chain using special vehicles, something that meant much larger capital costs. Accordingly, this group of Scanian wholesalers combined to build the first oil port with three tanks in 1898. It was constructed at the edge of the harbour by filling out the area outside Kockums shipyard. Paraffin oil and subsequently petrol were bought under the brand Pratt Petroleum. The oil terminal which was located at the farthest end of the port area was subject to strict security measures. A concrete diversion channel was formed to prevent oil spills from running out into the harbour. A steam engine and a generator supplying electric power were installed in order to avoid open fires in the area. Over a period of five years, imports of oil tripled and in 1901 it had exceeded 8 000 tonnes. The three tanks ran approximately 6 000 cubic meters of paraffin oil and petrol, which in present day terms, corresponds to what could be stored in 35 major petrol stations. New tanks were built around 1910. The company soon established retailers, usually ordinary grocery stores that increasingly adopted sales from the tank and pump rather than from barrels and jugs. It meant that distribution could be made by mobile tanks, either horse-drawn or put on automobiles. The first

service station was built around 1920. Domestic industrial production of petrol pumps also started at this time.³⁸ The Ljungmans Company in Malmö was one of the first and largest manufacturers in this field. With a solid distribution network for petrol, it became easier to use cars. When the registration of automobiles became mandatory in September 1906, registration by number was introduced. When the first register was established in 1907, 662 automobiles were registered in Sweden of which 61 cars were registered in Malmöhus county. Twenty of them were in Malmö.³⁹ At the time of the First World War, the car together with the electric tram had started to make its presence felt in the cityscape. In the first major traffic census in 1911, no less than 130 cars could be counted on one day at a crossing in the central square. However the city's taxi station was also situated in the square at that time. It was also noted, however, that at the same time 1000 bicycles, 30 000 pedestrians and 1500 ordinary horse or hand drawn carts passed the crossing.⁴⁰ It would not be until the 1920s that the car became the predominant form of transport.



11. *The new oil port in 1912 with its cisterns, just at the edge of the harbour.*

Source: Malmö museum.

ENERGY TRANSITIONS

At the turn of the century, Malmö had grounds for optimism. It was the fastest growing large city in the country and was in the middle of the transition from coal to new forms of energy transmission such as oil and electricity. This transition was evident in both the public sphere, workplaces and in homes. But hopes for a continued expansion did not last. During the 1920s, industrial employment increased in Malmö. However unemployment was also higher in Malmö than the national average during the crisis years. Recovery was also weaker between the crisis periods. This can be partly explained by developments prior to the 1920s. The second energy transition and the technological change that the combustion engine and electricity had brought about became the first major technology shift in the new industrial economy.⁴¹ The internal combustion engine changed local transport conditions during the 1920s. Between 1924 and 1931, the number of trucks tripled in Malmöhus county from about 1300 to over 4000. At the same time, they also increased in size.⁴² A study of privately owned railways in Scania in 1933 described competition from trucks and lorries as “murderous”.⁴³ It was now that the “railway death” began, first for smaller local railways and then increasingly to regional and even national lines. In the same way, within industry, the more flexible electric motor out-competed steam engines, with their spinning shafts and drive belts. The growth of electrical engine power in Malmö, measured by the number of horsepower, exceeded the national average in many sectors. This meant mechanization, rationalization and ultimately restructuring through mergers and closures. Growth industries were often linked to the new energy technology. After building its last steamboat in 1927, the Kockums shipyard concentrated on motor vessels. Oil tankers became a new specialty for Kockums where the first order was placed in 1926. Ljungmans production of petrol pumps became the largest mechanical workshop and the new electro-technical industry, was represented by a accumulator factory and a cable factory. The first major energy transition in Malmö took place in the mid-1800s, when steam and coal and their new technologies made it possible for the first time to concentrate energy in space and time. In the early 1900s, new types of energy carriers such as electricity and mineral oil were introduced in the city. During the 1920s, seventy to eighty years after the first energy transition, a new energy transition began in Malmö. These new types of energy transmissions and the technology

that accompanied them became dominant and displaced coal and steam engines. A period of seventy to eighty years has now passed since this second energy transition.

NOTES

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- 2 Malmö and Scania was during Medieval times a part of the Danish kingdom. Scania was resided to Sweden 1658 after a series of big wars in the 17th Century.
- 3 Gunnar Fridlitzius, "Handel och sjöfart – förändringens tid.", *Malmö stads historia. Tredje delen 1820-1870*, Oscar Bjurling (ed.), Arlöv 1981, p. 301.
- 4 Carl Linneus, *Skånska resa år 1749*, Södertälje 1982, p. 236.
- 5 B.H. Brorström to the bishop. 1845.03.07. Husie församling. Riksarkivet. Handlingar rör. Sv. Konungahus 2105:01. Vol. Lund bishopric.
- 6 L.G. Collin to landshövdingen. 1855.01.08. Bara härad. Riksarkivet. ÄK 745 Vol 2. Skogshushållningskommittén 1855. Kristianstads länsstyrelse. Malmöhus länsstyrelse.
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- 8 Lennart Jörberg, *A history of prices in Sweden 1732-1914. Vol. 1, Sources, methods, tables*, Lund, 1972.
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- 12 Per Eliasson, *Skog, makt och människor. En miljöhistoria om svensk skog 1800-1875*. Malmö 2002, p. 245.
- 13 Jörg Brunet, *Från ollonskog till pelarsal. Införandet av planmässigt skogsbruk på Skabersjö gods 1838 och dess långsiktiga effekter på skogsareal och beståndsstruktur*, Alnarp 2007.
- 14 Eliasson 2002, p. 194-202.
- 15 Helle Serup, *Ordnets skovbrug i Danmark 1800-1950*. Ph.d. afhandling KVL, Frederiksberg 2004, p.11-116.
- 16 L.G. Collin to the bishop. 1845.03.08. Skabersjö församling. Riksarkivet. Handlingar rör. Sv. Konungahus 2105:01. Vol. Lund bishopric.
- 17 Serup 2004, p. 119.
- 18 Skabersjö 1838-1878, cuttings 1,7 m³/ha yearly on 760 ha. Forestry on 13 700 ha of 33 000 ha totally in Malmöhus county 1865. Coal import to Malmö port 1865 was 42 000 ton. Energy content 6910 Mj/ m³ for wood and 29 000 Mj/ton for coal. Brunet 2007; BiSos 1868. Jordbruk och boskapsskötsel. Malmöhus län.p. 32; Persson 1915.
- 19 Persson 1915, p. 37-41; Gunnar Fridlitzius, "Från span-nmålstunnen till smödröttlar. Handel och sjöfart 1870-1914." *Malmö stads historia. Fjärde delen 1870-1914*, Oscar Bjurling (ed.), Arlöv 1985, p.456.
- 20 Fridlitzius 1985 p. 456-477.
- 21 Göran Bo Göransson, *Resan över Sundet*, Malmö 1961. This ship-

- ping company dominated the ferry traffic between Malmö and Copenhagen during the 20th Century until the bridge was inaugurated 2000, exactly hundred years later. Today there are no ferries in the southern part of Öresund.
- 22 Since railways were faster and more reliable early proposals was made for a tunnel under Öresund. An application for a railway tunnel was made to the Swedish and Danish governments by a French consortium already in 1886. It was a part of a giant all-european railway project with the aim to connect Scandinavia, UK and the Continent with a common rail network. Markus Idvall, *Kartors kraft. Regionen som samhällsvision i Öresundsbrons tid*. Lund 2000, p. 42.
 - 23 *Emigrationsutredningen, Bilaga XX*, Stockholm 1911, Tabell 7, p. 76.
 - 24 Richard Willerslev, *Den glemte indvandring. Den svenske indvandring til Danmark 1850-1914*. Köpenhamn 1983, p. 84.
 - 25 Rolf Peter Sieferle has used this kind of example to calculate a hypothetical forest area. Rolf Peter Sieferle, *The subterranean forest*, Cambridge 2001, p. 104. Here it is the real forest area and growth rates that are used. SOU 1932:26. *Uppskattning av Sveriges skogstillgångar*. Verkställd åren 1923-1929, Stockholm 1932.
 - 26 Total forest area 1 000 061 ha. Energy content: wood and coal as in footnote 18, petroleum 42 000 Mj/ton. Sources: Coal: Persson 1915 p. 187; Petroleum: Malmö stadsarkiv. Hamndirektionen. Fartygs- och varu samt lossnings- och lastnings- statistik. H 1:7; Electricity: H.M. Molin, *Malmö stads elektricitetsverk dess tillkomst och utveckling under halvsekklet 1901-1950*. Malmö 1951, p. 194.
 - 27 Göteborg had a higher growth rate than Malmö also in the 1860s.
 - 28 Göran Olsson, "The struggle for a cleaner urban environment: Water pollution in Malmö 1850-1911." *Ambio* No. 4-5 August 2001, p. 287-291.
 - 29 *Malmö – den törstande staden*. Erik Winnfors (ed.), Ohlsson & Winnfors, 2007.
 - 30 Malmö stadsarkiv. Drätselkammaren. Andra avdelningen. 12 augusti 1899.
 - 31 Although new wells were continuously drilled, water supply continued to be inadequate. In 1948 a new water works was built at the lake Vombsjön, where the lake's water slowly infiltrates a number of about 30 meter deep wells. About 80% of Malmö's water now comes from lake Vombsjön
 - 32 Olsson 2001.
 - 33 Olsson 2001.
 - 34 *Malmö's kartor. Från 1500-talet till idag*. Tyke Tykesson (ed.), Lund 2003, p. 142-143.
 - 35 *Malmö – den törstande staden*. p. 93-95; Eber Ohlsson, *Rosendals avloppspumpstation*. VA-Syd, u. å.
 - 36 P. Isberg & H.M. Molin, "Gas- och elektricitetsverken." *Malmö. En skildring i ord och bild av stadens utveckling och nuvarande tillstånd. Andra delen*. G. Hårleman (ed.), Malmö 1914.
 - 37 *Malmö stads årsbok 1920*, p. 332.
 - 38 G. Hagerman, *Sydsvenska petroleum's aktiebolaget 1893-1923*, Malmö 1923.
 - 39 Landsarkivet i Lund, Malmöhus läns landskansli. Bilavdelningens arkiv. Besiktninginstrument för automobiler och motorcyklar. E I:1. 1907-1911.
 - 40 *Malmö stads årsbok 1911*, Malmö

- 1911, p. 10-11.
- 41 Bengt Åke Häger, "I skuggan av världskrig och världskris." *Malmö stads historia. Femte delen 1914-1939*, Oscar Bjurling (ed.), Arlöv 1989, p. 408.
- 42 E. Augustinsson, "Statistiska uppgifter för åren 1923-1936", in Karl Enghoff, *De allmänna vägarna i Malmöhus län*. Lund 1938, p. 136.
- 43 Mattias Qviström, *Vägar till landskapet. Om vägars tidrumsliga egenskaper som utgångspunkt för landskapsstudier*. Alnarp 2001, p. 176.

COAL SMOKE POLLUTION IN INDUSTRIAL MALMÖ AND COPENHAGEN

Lars Berggren

Descriptions of major cities during the industrial revolution normally mention problems such as overcrowding, substandard flats, diseases and an unhealthy environment. Sweden's cities are no exception to this picture. When industries were established during the nineteenth century, large housing estates for workers were built at a rapid pace. These were the sanitary evils of growing concern, and diseases such as tuberculosis were common among the residents. The work environment in the factories was characterized by poor air quality, high accident rates and noise. Factories also contributed to polluting the external environment by discharges into the water and smoke from the growing number of chimneys.

In an article in this book, Per Eliasson has shown how Malmö between 1820 and 1920 was involved in two major energy transitions and how the city was changed by them. In this contribution, I wish to discuss how coal smoke pollution from factories blackened the industrial environment and how the authorities handled the issue.

INDUSTRIALIZATION IN MALMÖ

From being a relatively small city with about 5,000 inhabitants, Malmö's population expanded rapidly during the nineteenth century. Between 1820 and 1870 Malmö was one of the most expansive cities in the kingdom in terms of population growth. At the turn of the century in 1900, Malmö was the third largest city in Sweden with a population of over 60,000. These figures are partly explained by the creation of a number of industries from the 1840s onwards, and partly by the radical transformation of the Scanian countryside. Important conditions for the industrialization of Malmö were the city's growing importance as a seaport, the proximity to Denmark and the location near good arable soil. Industrialization in Malmö was built largely around three industrial sectors: engineering, textiles and food manufacture.

Frans Henrik Kockum established a foundry and a machine shop in 1840. The products included boilers and other machines for the growing industry. In the 1850s, the workshop started to manufacture rail carriages and in the early 1870s Kockum's Engineering Works built a shipyard in the port. The shipyard was visited by the English engineer William Smith in 1872. He noted that technology was as modern and advanced as that of the British shipyards. The modern textile industry was built in the 1850s and the 1860s, though it was preceded by shops in the eighteenth and nineteenth centuries. Manufakturaktiebolaget was founded in 1855 as a cotton spinning mill, and during the same decade a cotton weaving mill was also built. The largest and most important factory was a wool factory, Malmö Woollen Factory Company. At times, the plant was the most significant of its kind in the whole of Sweden. Food manufacturing industries had also earlier ancestors in the city, but during the latter part of the nineteenth century several new factories were founded, among them tobacco factories, chocolate factories and breweries. Just outside Malmö, a sugar refinery was founded in Arlöv. At the end of the nineteenth century and the beginning of the twentieth century, the beet sugar industry played an important role in Skåne. In 1907 the Sugar Company was formed through a fusion of different sugar refineries in southern Sweden. Towards the end of the nineteenth century, the production of cement and building materials was significant in the lime-rich Limhamn just outside Malmö.¹

Several of the new plants were built near the city's canals. When the older fortifications were demolished in the early 1800s, the canals were straightened. This freed up land, which was used for industries. In this

way, concentrated industrial clusters were located near residential areas. The new industrial environments thus came to make their mark on the fringe of the inner city.² Several of the new industries discharged pollutants directly into the canals. An account was given by Axel Danielsson, editor of the socialist newspaper *Arbetet*:

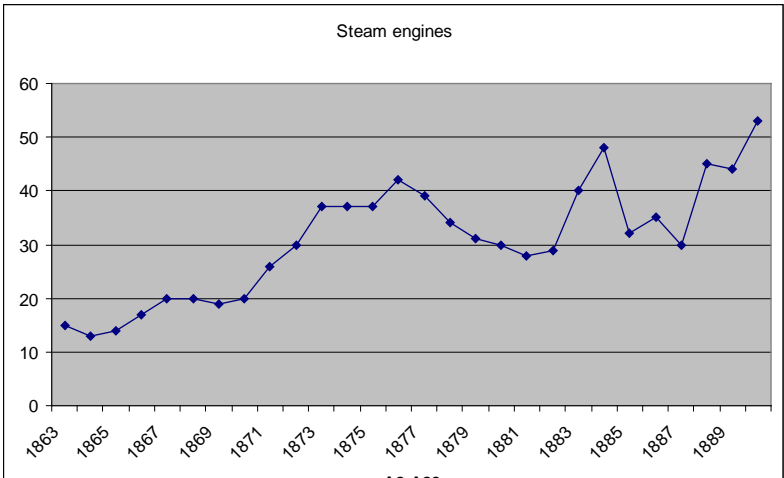
The canal, which, with its semicircle ... divides the suburbs from the old city, is stirred up by the surge and spreads in all directions a thick, horrible smell of dissolved refuse from industry, all mixed together. The water is black and train-oil shiny, but as the plants begin discharging their sludge, different coloured spots arises at the outlets of the sewages, and each of these stains smells in its own way until it runs together with the others. Factories of all kinds vomit impurity: weaving mills, spinning mills, workshops, slaughterhouses, laundries and tanneries. Factories emit, in another form, chocolate, sweets, margarine, macaroni, sausage, mustard, white grease, vinegar, matches, cigars, matches, ink, guano, soaps and perfumes. The gutter creates its bouquet, while the content of the gutter slowly flows down along the banks. In this way, the atmosphere of the city is created.³

The problem of the stinking canal water was raised early on by the authorities in Malmö.⁴ However, it would take a long time before the problems of smoke pollution received any attention.

During the industrial revolution steam power was used to operate the machines in the new factories and workshops. This meant that the use of fossil fuels rose very sharply, since boilers were fired by coal. When coal was used as fuel in boilers it created a black, visible smoke, which gave a character to the industrial landscape.

Diagram 1 shows the increase in the number of steam engines in Malmö between 1863 and 1890. A word of warning about the statistics is necessary, because there might be a significant lack of returns. Some factory owners were careless about the information which was to be submitted annually. In addition, some kinds of establishments are lacking. For example, the state railway workshop was not defined as an industry in industrial statistics, although it had several hundred workers and a relatively large steam engine. The number of steam engines is therefore almost certainly too low. Furthermore, information on the number of steam engines tells us nothing about how powerful the machines were. We would need this kind of data to determine how large the environmental impact of a steam engine might have been. Therefore, Diagram 2 shows the amount in terms of horsepower.

In this case too, official statistics should be critically discussed as information is lacking. It is difficult to bring the table up to the 1890s and thereafter, because the factory owners did not make any distinction between the horsepower of steam engines and power machines operated by gas or electricity. The statistics must be supplemented with other materials in order to give a more complete picture. It is, however, clear that the amount of horsepower increased sharply during the late 1880s, and statistics from the following decade (not reported here) indicate a further increase.

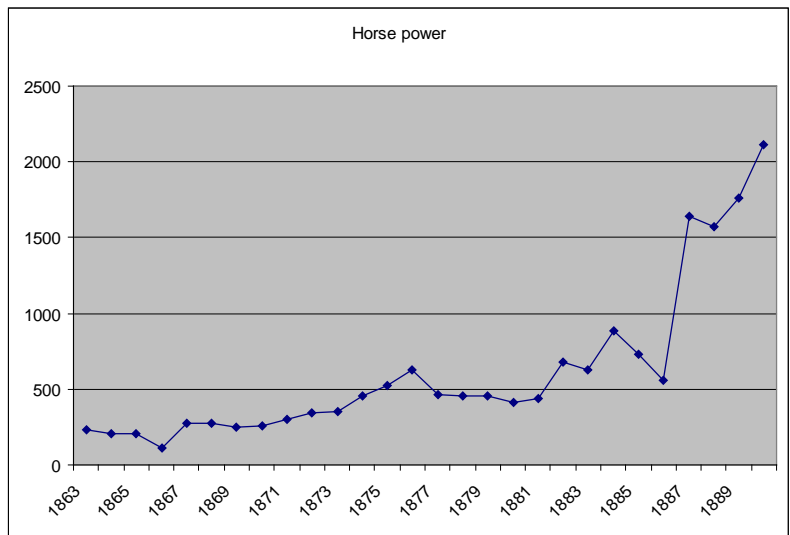


1. *Steam engines in Malmö factories.*

What can we say about coal consumption in the various factories? The minutes of the public health committee of the early 1900s give a few points. The committee made continuous investigations, including steam engines, coal consumption and the height of chimneys.

The cotton spinning mill was driven by a steam engine of 300 horsepower, and over 11.5 hours a day it consumed 3,200 kilograms of coal. The chimney had a height of 37 metres. The Woollen Factory had a steam engine of 820 horsepower, and during 11.5 hours it used 8,100 kilograms of coal. The chimney was 58 feet tall. Let us try to extrapolate from these data. In 1890, the steam engines in Malmö, according to the industrial statistics, represented 2,111 horsepower. If coal consumption was as it was in the Woollen Factory it would amount

to 20,852 kilograms per day or more than 20 tonnes. In a six-day week the sum would be 125,112 kilograms and the annual consumption would then be 6,505,824 kilograms or about 6,505 tonnes.⁵



2. Horsepower steam engines in factories.

There are obviously some problems with this calculation. We do not know whether the other steam engines consumed as much as the wool factory. However, the calculation provides a point of reference, and a qualified guess is that the total coal consumption in Malmö industries was considerably higher.

COAL SMOKE POLLUTION IN MALMÖ

In Sweden, the problem of smoke emission was highlighted by the urban public health committees. The committee in Malmö addressed the issue in the early 1900s, and wrote in its annual report:

Studies have been made regarding the amount and nature of the smoke, which rises from the chimneys at the city's industrial facilities, in order to determine the measures which the Committee needs to take to reduce the inconvenience caused by smoke from factory chimneys.⁶

One of the first cases relating to air emissions was not about coal smoke, but concerned the incineration of waste phosphorus. It was a resident, S. Barnekow, who complained that smoke from Swedish Match Company factory blew against his residence in Östra Förstadsgatan when the wind was from the east. The health committee decided to conduct the study. Phosphatic waste was incinerated in a special furnace four times a day for approximately 20 minutes at a time. The rather thick smoke generated amounted to about one hectolitre. The committee found that the chimney was only 10–12 metres above the ground, which corresponded to a low one-storey building. It was not high enough to remove the smoke. When heavy smoke was coming up through the chimney it fell to the ground and caused the discomfort Barnekow complained of.⁷

A. Wollert, Director of the Swedish Match Company, was called to a meeting of the committee, and he declared himself willing to take action. A report towards the end of the year stated that the incinerator and chimney had been torn down and a new furnace built on a different side of the factory site. The new furnace had a smoke exit to a higher stack. The result was that both smoke and vapour combustion had to run high enough so that the wind could remove it over the roofs of neighbouring houses, "without discomfort to local residents".⁸

In *Malmö stads historia*, there is a picture showing what Barnekow's house looked like in 1906. This corner was "a natural eye-catcher". Barnekow was an engineer, and he belonged to a noble family with roots in Pomerania. It was a rather powerful person who filed complaints against the match factory.⁹

In the autumn of 1901 and the spring of 1902, the committee considered a couple of complaints against bakeries' discharge of coal smoke. The first concerned a bakery in Södra Förstadsgatan, and interestingly enough the complainant was a managing director of another company. Thick, black smoke from the bakery's low chimney caused problems in the adjacent plate goods factory.¹⁰ But it was also reported that the smoke caused discomfort to people who lived nearby. In December, it was reported that the bakery was ordered to implement changes by

January 1902, but that the chimney had already been increased by one metre.¹¹ Interestingly enough, it was a manager who made complaints about another company's emissions. Another of these cases concerned a bakery which had a boiler that fired with coal and a low stack. The smoke was reported to penetrate into buildings around it. The bakery received an injunction, and the height of the chimney was increased to 15 metres.¹²

In the spring of 1902 the problems caused by emissions from the textile mills were highlighted for the first time. There were three large textile factories in Malmö. However, the spinning factory had been acquired by its neighbour, the woollen factory, so these plants had the same owner. At a public health committee meeting in April 1902, the problems of smoke emission from the three factories were discussed. It was reported that the smoke from the cotton weaving factory caused discomfort

... to local residents and to other persons, as the smoke from those factories either rises in calm weather and hangs over the buildings near the factory, and it eventually falls down among them, or in windy weather is blown slightly further away before it falls to the ground, in both cases it enters the staircases and flats, causing great discomfort to people living there.¹³

The plant had three boilers with a total of 135 horsepower, and coal consumption was 40 hectolitres per day. The boilers were fired between 5 a.m. and 6 p.m., and two boilers were used constantly in parallel. There was a stack of 20 metres.¹⁴

On the same occasion, the smoke emission from the two other textile factories was discussed by the committee. With similar expressions such as those quoted concerning the cotton weaving mill, the smoke was described as a problem for the local residents.

As has been noted above, the cotton spinning mill was driven by a steam engine of 300 horsepower, over a day it consumed 3,200 kilograms coal, and the chimney had a height of 37 metres. The Woollen Factory had a steam engine with as much as 820 horsepower, and in a day it used 8,100 kilograms of coal. The chimney was 58 feet tall.¹⁵

The three textile factories were asked "as soon as possible, to take such measures for coal combustion that inconvenience as far as possible may be solved".

At a meeting in May 1902 complaints from Malmö Steam Kitchen Company were discussed. This company had built a hotel called *Tem-*

perance, but the board soon discovered that it was not easy to operate hotels in that area. Soot and smoke were pushed into the hotel rooms, particularly when south-westerly winds blew. The nearby plants that emitted coal smoke stated that it was difficult to make any improvement. Although some measures had been tested, the board of the cotton weaving mill argued, and some new solutions would be tested, they had better not be too expensive. A couple of months later, and after new complaints, the cotton weaving mill declared its willingness to build a higher chimney, up to 30 metres.¹⁶

The experience of smoke nuisance was therefore significant, and numerous complaints were also submitted to the public health committee during first decades of the twentieth century. What is somewhat puzzling, however, is that it still took so long before the problems were brought to the attention of the committee. At that time, as we have seen, Malmö had been an industrial city for half a century. The obvious answer to the question is the increased and intensified use of machinery during the economic boom around the turn of the century in 1900. More and more – and certainly increasingly powerful – steam engines were used probably for a growing proportion of days in order to increase work intensity, or to use a more modern expression, productivity (cf. diagrams 1 and 2).¹⁷

In Copenhagen, problems of coal smoke pollution were highlighted earlier than in Malmö. Since the early 1820s complaints had been directed against factories that emitted smoke. However, it was only in the 1850s that the authorities took action against the black smoke. The Building Act of 1856 ruled that large fireplaces should have a stack of 22 metres, a height which was increased to 31 metres in the early 1870s. The health board in Copenhagen handled the issue of problems with smoke. Measures were similar to those in Malmö: raising of chimneys and technological improvements in combustion, etc. However, the legislation was not effective, at least not until 1886, when more restrictive rules were imposed. Now the factory owners could be required to fix the problems within a certain time. The Danish historian Ole Hyltoft writes that the smoke nuisance probably increased despite the tightened rules. More and more steam engines, combined with increased private coal consumption, led to increased emissions. It was also difficult to find effective solutions, and there was a lack of technicians who could address the issues. There were also some experts who stated, drawing from the miasma

theory, that smoke actually purified the air. Hyldtoft says, however, that a number of improvements were made, not least through the fuel-saving technology. There are also examples of protests from residents in the vicinity of polluting factories that led to changes.¹⁸

A CULTURAL-HISTORY PERSPECTIVE

In the 1870s, *Sveriges industriella etablissementer* ("Sweden's Industrial Establishments") was published. In this great book there is a significant number of lithographs, showing factories and engineering plants. Smoke from chimneys mark that production is in full swing. In fact, this would set the tone for the phase of industrial upswing. Chimneys became a symbol of industrial progress, but as such they had to appear in full activity. Fuming chimneys were to symbolize economic success and growing productivity. They were potent markers that signalled modernity, progress and optimism.

The British historian Stephen Mosley has shown how people perceived the smoke in the heavily industrialized city of Manchester. Popular poems and songs were written about the relationship between wealth and chimney smoke. Especially during economic crisis fuming chimney symbolized security and "good times". This was clearly expressed by a traveller from Trinity College in Dublin in 1842:

Thank God, smoke is rising from the lofty chimneys of most of them!
For I have not travelled thus far without learning, by many a painful illustration, that the absence of smoke from the factory-chimney indicates the quenching of the fire on many a domestic hearth, want of employment to many a willing labourer, and want of bread to many an honest family.¹⁹

It was therefore important that chimneys really were portrayed with smoke, because chimneys without smoke signalled that production had stopped. In the 1860s, when the English cotton industry was hit by raw material shortages as a result of the North American Civil War, the poem *The Smokeless Chimney* was a big seller. The poem ends with the words: "We may see these Smokeless Chimneys, Blackening all land again."²⁰

There was therefore a popular notion, widespread in parts of the working class, linking factory smoke with welfare – or rather the opposite, chimneys without smoke were associated with poverty. That factory owners more clearly saw the link between chimneys with smoke and economic growth is of course easy to understand. What is interesting is that the view was also shared by some experts who had to mitigate smoke impacts. On top of this: smoke could actually be healthy, because the coal seemed cleansing. The idea that diseases spread by air, the so-called miasma theory, was cherished at this time. Smoke and soot from carbon emissions were believed to combat the spread of typhoid and other diseases. Even when the miasma theory was abandoned, some maintained that coal had disinfecting effects.



3. Arlöv sugar factory, with smoking chimneys.

Source: Malmö Museum.

This link between black smoke and prosperity could vary in different ways, but it always resulted in the reeking chimneys represented success and progress. People from different classes had partly different arguments for this. The workers wanted to avoid unemployment and factory owners wanted to increase their profits. Specialists and experts of various kinds could have different reasons for writing favourably about the smoke. Perhaps they were simply captivated by ideas of progress.

Parallel to this positive vision, however, there grew an alternative vision of coal smoke as pernicious and dangerous. The smoke could be the symbol of all the problems generated by industrialization.²¹ Towards the end of the 1800s in England smoke was associated with national decline. Britain had been a leader in the industrial revolution, but other countries, not least the United States, were on the rise. Critics argued that the “physical degeneration” which it felt able to observe in the English cities could partly be explained with reference to the adverse effects of coal smoke. Critics organized in different ways, including the formation of the Smoke Abatement Committee, which advocated parks and open spaces to give “lungs” to towns.²²

Much of the criticism directed against coal smoke was couched in the form of criticism of civilization. It was not the source – the fossil fuel coal – that was put at the centre of the campaigns. It was the observable problems that formed the starting point for criticism. Diseases such as tuberculosis, pneumonia, bronchitis and asthma were easily attributable to the bad air. The bourgeoisie was worried about impact of smoke on the moral and physical condition of the working masses and feared a threatening proletariat. Poverty in urban slum areas was visible and tangible.

In the early twentieth century scientific initiatives to combat the problem of air pollution increased. In many contexts, therefore, the morally indignant and experience-based criticism succumbed to scientific discussions of factory emissions. An example is the study carried out by Richard B. Mellon at Pittsburgh University in the USA in 1913–1914. In nine volumes, a thorough review of smoke emission and its consequences was carried out. Although the study focused on problems in the USA, it was based on a detailed international comparison. The preliminary results were presented at the International Smoke Abatement Exhibition and Conference in London in 1912. International cooperation was started to take action on the smoke issue, and it became the pattern for the enactment of a new wave of laws. These were based on scientific studies and ruled that specifically trained or technologically knowledgeable inspectors should be responsible for working with cities to improve air quality. Efficiency and rationality were in focus. Smoke was associated with wasteful inefficiency. Education and better technology were regarded as necessary to solve the problems. A country’s ability to overcome the smoke problems was linked to the efficiency of production and good health among the citizens.²³

Smoke and chimneys were still regarded as symbols of industrialization, but the visions of the future differed. Where some saw the expanding industrial landscape, others saw pure nature and the smokeless air. Both may have pinned their hopes on wealth created by industry, but the symbols were loaded with different meanings and linked to different expectations of what the future would bring. However, consciousness about knowledge and professional technology was more widely spread. Concepts such as smoke and emissions were thus ascribed a new and wider meaning, no longer solely based on the fact that the smoke was black and visible.

However, as late as 1904, it could happen that a local newspaper, *Arbetet* in Malmö, wrote idyllically about chimneys and smoke:

Malmö has its beautiful sides, we saw it yesterday evening at sunset, this beautiful sunset coloured the sky red as high up against the Zenith. We stood at the Rörsjö Bridge and saw the dark water of the canal in front of us, mirroring the blushing sky and the newly lit gas lamps greenish yellow light. From a couple of high chimneys black smoke curled against the flaming firmament, where the moon's narrow, white silver cut was already shining dimly. [...]

... It was undeniably beautiful, what we saw. And as a dreamer, we stood on the bridge, in the middle of the throbbing life, no one had time, had eyes for the beauty, which slowly disappeared in the west.

Because Malmö also has so many ugly sides. And Malmö is a major industrial city, where the rush of life in the struggle for existence stifles the individual sense of beauty.

And that is sad.”²⁴

NOTES

- 1 Lars Berggren & Mats Greiff, *Från sillamarknad till SAAB-fabrik: Industrialisering, facklig organisering och politisk mobilisering i Malmö*. Södra Vallösa, 1992, pp. 13 ff.
- 2 Kerstin Martinsdotter & Arne Järtelius, *Vart tog Malmö vägen? En studie av fabriker i Malmö innerstad 1897*. Unpublished seminar paper, Malmö University, 2000.
- 3 Axel Danielsson – *levnadsteckning, karaktäristik, urval av skrifter...*, p. 686. The quotation is from 1894.
- 4 Göran Olsson, *Hot mot och kamp för en ren stadsmiljö: Vattenförorenning i Malmö 1850–1908*. Essay, Department of History, Lund University, 1999.
- 5 Protokoll 29/4 1902. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 6 Cited from Carl Lindman, *Sundhets- och befolkningsförhållanden i Sveriges städer 1851–1909*, Helsingborg, 1911, p. 220.
- 7 Protokoll 27/8 1901. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 8 Protokoll 30/12 1901. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 9 *Malmö stads historia fjärde delen/1870–1914*, p. 464. Stadsfullmäktige i Malmö, Malmö, 1985. Note that the caption erroneously says Södra Tullgatan instead of Östra Tullgatan.
- 10 Protokoll 29/10 1901. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 11 Protokoll 30/12 1901. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 12 Protokoll 18/6 1902 & 27/5 1902. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv. See also the minutes from 30/12 1901 for a couple of other bakery cases.
- 13 Protokoll 29/4 1902. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 14 Protokoll 29/4 1902. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 15 Protokoll 29/4 1902. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 16 Protokoll 22/12 1903. Hälsovårdsnämnden i Malmö. Malmö stadsarkiv.
- 17 For a discussion of air pollution in Malmö 1928–1950, see Göran Olsson, *Lufvföreningsfrågan i Sverige 1902–1950*. Essay, Department of History, Lund University, 1994.
- 18 Ole Hyldtoft, “Stank, kulrøg,

- og epidemier: Industri og miljø i Danmark i 1800-årene,” in Lars J. Lundgren (ed.), *Människan och miljön*, Department of History, Umeå University, 1991, pp. 127 ff.
- 19 William Cooke Taylor 1842, quoted from Stephen Mosley, *Chimney of the World: A History of Smoke Pollution in Victorian and Edwardian Manchester*, Cambridge, 2001, p. 72. Mosley analyses “competing environmental discourses, focusing on how highly diverse narratives about smoke were used by contemporaries to rationalise, naturalise and criticise the dramatic changes wrought by air pollution in nineteenth-century Manchester”. Quoted from the book cover.
- 20 Ibid., p 73.
- 21 Mosley, pp. 96 ff.
- 22 D. Stradling & P. Thorsheim, “The Smoke of Great Cities: British and American Efforts to Control Air Pollution, 1860–1914,” *Environmental History* 4:1, 1999.
- 23 Ibid., pp. 19 ff.
- 24 *Arbetet* 12/10 1904, signed Armand.

"I BROUGHT A HAZELNUT FROM MACEDONIA"

Cultural and biological diversity in a globalizing world

Pernilla Ouis and Ebba Lisberg Jensen

INTRODUCTION

This article deals with the cultural parallelism between biological and cultural diversity as manifested in allotment garden areas in Malmö. Applying an historical perspective, we argue that the mobility of species is almost as old as human history. Whenever new species are introduced, as when cultural traits meet, differences may be welcomed and introduced in the already existing context, just as they may be shunned, hated and persecuted. Introducing new species may be an efficient way of colonizing land, as shown by Alfred W. Crosby.¹ In an increasingly globalized world, people seem to bring with them their old plants, and they exchange varieties and species with each other. In a multicultural city like Malmö, this is practised among the many allotment gardeners from all over the world. Sometimes it enhances contact and integration, and sometimes cultural practices and species comes to symbolize difference, contact with the country of origin or even ethnic identity.

The article starts with a general overview of the history of migration and migrating species. Then we introduce the reader to the ideas of biological and cultural diversity and the discursive parallels between them. After that, we present some of our empirical data from interviews with allotment gardeners of different ethnic origin all over Malmö. Finally, we critically discuss how cultural and biological diversity as sometimes

different but sometimes closely connected sets of associations are used in official discourse on cultural and biological change.

Malmö has a long history of multiculturalism. Already in medieval times, Malmö was a dynamic centre of fishing and trade for people from all over the Baltic region. Germans, Poles, Danes and Swedes met and handled economic, religious and political matters on the sandy beach in the growing city. Today, Malmö is one of the most multicultural cities in Sweden, which can easily be observed in parks and allotment gardens, where people of different origins engage in leisure activities or in small-scale cultivation.

BACKGROUND: MOVING PEOPLE, MIGRATING SPECIES

Whenever people through history have travelled or moved, they have brought with them species of plants and animals from their original habitat. For example, agricultural expansion spread species like wheat, sheep and goats from the original area in “The Fertile Crescent” all over Western Europe. However, it has been debated whether groups of people moved with their habit of cultivating and their species, or if it was rather the agricultural *idea* that was spread. Agriculture has proven to be a very successful strategy from a human perspective. Agricultural species have been so closely connected to culture – in fact, *cultivare* means “to grow” in Latin. Societal systems often evolved around bulk species such as wheat, rice, maize, or, when it comes to animals, cattle, sheep, camels and goats.

During the European colonization of the “New World”, the use of efficient large-scale agricultural systems, but mainly the bringing of expansive and fast-growing species, was part of the strategy of domination. This has been thoroughly elaborated by the environmental historian Alfred W. Crosby.² Wheat and cattle are among the most well-known. Crosby also discusses the fact that not only useful plants, but also weeds, forage plants and unintentional species like “wild oats, common foxtail, chess, bromes, Italian ryegrass”³ as well as illnesses such as smallpox, were introduced with disastrous consequences in the new environment.

Cross-cultural contacts and global trade have simultaneously led to the movement of agricultural, horticultural and medical plants in all

directions over the globe, not only by Europeans or from Europe to other parts of the world. For example, the potato, originally a South and Central American tuber, was brought to Europe during the sixteenth century and eventually became a staple food in all Europe. Cassava was brought to Africa from South America. Tomatoes and tobacco were soon planted all over Europe. Coffee, originally an Ethiopian plant, was spread by Arab merchants to Northern Africa, and was later exported to Brazil and the West Indies.

In some cases, the new coming species went wild, such as the mustang that spread all over the north American continent, and the dromedaries that have colonized the Australian desert. These examples show that newcomers sometimes are able to adapt to new environments without causing damage. In other cases, the local ecosystems have been severely altered through the introduction of new animals, weeds and illnesses. One of the most well-known examples of this is the introduction of rabbits to Australia and New Zealand. Such cases have created the idea that all new species are *invasive species*, spreading uncontrolled and putting the ecosystem out of balance. Despite the fact that migration of species is a phenomenon as old as human history, it is still controversial.

DIVERSITY

Biological diversity is a concept with a long history, sliding between science and aesthetics or ideology. Originally, ecologists during the 1930s up till the 1950s discussed whether succession in an ecological system leads to a more efficient system in terms of handling energy. Later on, the idea of biological systems in equilibrium, balance, was introduced. It was suggested that a *mature* ecosystem reached a state of optimal functioning. In the 1980s a number of biologists found out that heavy exploitation of, for example, rain forests caused the extinction of many species, a fact that these more or less overtly “conservationist” biologists found alarming. To shed light on the issue of mass extinction and to make it acceptable to the scientific community, the problem, along with the concept of biological diversity, or *biodiversity*, was consciously launched at a conference held by the American Science Association in Washington 1986.⁴ In that context, the concept came to mean *a value*

consisting of a diversity of species, making the habitat worthy of protection. The researchers put all their scientific credibility into the campaign, which was very successful. Biodiversity soon became a buzzword in conservationist debates all over the world, even though, or maybe because, the concept was laden with aesthetics and a basically radical idea about the value of protecting not only species as such, but also their biotopes. In 1992, Convention on Biological Diversity was signed by many countries at the UN Conference in Rio de Janeiro and thus the concept took a great leap into established politics.

But biodiversity was, and still is, a contested concept. It is formally said to denote diversity on three levels: landscape, population and individually. Among some biologists, it is used as a neutral term, simply equalling the fact that there is diversity on these three levels. Among others scientists, as among some conservationist activists fighting to save forests or other biotopes from exploitation, the concept is used to denote a high level of “integrity” or “untouchedness”.⁵ In this sense of the word, a city dump where a grand variety of seeds sprout, a zoological garden with animals from all over the world or a park with hundreds of tree species do *not* represent biological diversity, regardless of the variation to be found there. The term is then set aside primarily for what is sometimes called “virgin” ecosystems.

On the other hand, biotopes that have been influenced by humans for decades or millennia may contain great biological variation, sometimes directly as a result of human activity. In Northern Europe, meadows that have been cleared, grazed, cropped or otherwise harvested since prehistoric times may be extremely rich in species, and only a few years without tending will wipe out living conditions for species that are susceptible to overgrowth or need trampling to grow. Extensive land use systems such as Amazonian slash-and-burn cultivation also sometimes enhance species diversity. Among many scientists and conservationists, though, this kind of man-made diversity is valuable and deserves protection too.

Thus, biological diversity may be perceived as a value to be found in a natural setting, untouched by human hand. Or it may be said to exist where humans have been influencing their environment for a long time in what is thought to be a benign way. To put it very bluntly: Biological diversity is more or less unconsciously associated with an older order, with premodern circumstances.⁶

Metaphorically, aesthetically and ideologically, diversity can be said to be a reaction to the order, monoculture and efficiency of modern

society.⁷ In conservationist issues, it is not human activity as such that is opposed to biological diversity, but modern practices. Modern forestry as well as modern agriculture during the 1900s was very much focused on techniques to achieve unity, not to say uniformity, which was thought to improve productivity. Not only clear-cutting, large-scale monocultures and new, modern varieties of crops, were introduced to improve productivity, but older habits and local varieties were politically opposed as being old-fashioned and anti-development. The use of pesticides and herbicides was another expression of this urge and industrial development.

Also in political issues dealing with cultural and ethnic identities, modern society has up until today focused on unity, not to say uniformity.⁸ A modern nation state, like Sweden, strove to eradicate the cultural differences between newcomers, immigrants and ethnic minorities. The political goal was *assimilation*, or, in an American context, a melting pot, where differences were thought to blend and eventually disappear. Then, in the late 1980s, a critique against this ideal started to grow in the USA. Cultural diversity, a multitude of ethnic identities, little by little took over as a political ideal and changed the way society looks upon and handles cultural differences. What was formerly thought to be a threat or simply a disturbing variation is today a goal. Just like “biological diversity”, “cultural diversity” forms a conceptual frame that is so general that it can easily be accepted by society, though it is inherently full of contradictions and conflicting interests.⁹ Both phenomena – or ideals – are today held up as the basis for sustainable development (another politicized and deeply contested concept). In a postmodern society, diversity is “all things good”, an ideal that cannot be questioned.

A city like Malmö, with one of the highest immigrant rates in Sweden, asserts the values of being a “multicultural city”. This is true, but it is also a poorly integrated city. Political conflict and poverty have made a great number of people move to Sweden during the last twenty years. Some of them, mainly elderly people, have taken up gardening in one of the many allotment garden areas in and around Malmö. There, people from all over the world actually form a cultural diversity, meeting (but not always mixing) practices, habits, tips and sometimes, exchanging species with their neighbours.

BIOLOGICAL AND CULTURAL DIVERSITY IN MALMÖ ALLOTMENT GARDENS

Sometimes cultural diversity contributes directly to biological diversity, in one of the denotations of the concept, i.e. a diversity of species. In our present research project on the outdoor recreation habits of immigrants in Malmö, we have conducted interviews with people of immigrant origin in different settings. It is often presumed that immigrants only want to barbecue and picnic in parks and on beaches as their main outdoor recreation activity. This seems to be true to some extent, but in the numerous allotment garden areas in and around the city, we have noticed that many immigrants take great interest in cultivating vegetables and flowers.¹⁰ The focus in these popular publications is on the variety of introduced exotic species, originating in the cultivators' home countries and replanted in a Swedish setting.

Our method when mapping this field was very simple: We approached cultivators and asked them about their allotment gardens, what species they grew and how they used them. If the communication turned out well, we went on to ask the gardener about his/her origin and gardening habits. One of us asked the questions, the other one took notes. Often, but not always, gardeners told us facts about their situation, family and traditions. A majority of our informants were of Middle Eastern or Eastern European origin, of both sexes, most of them in their fifties and sixties. In this context, we will denote them "Greek man" or "woman from Palestine" even if they may have been Swedish citizens for a long time.

Our impression is that the majority of the gardeners use their allotments as was originally intended by the founders: partly for recreation and partly as a means to improve the household economy and the nutrition status of the family. A majority of the older gardeners told us that they gave their surplus away to children and grandchildren, and even that they "had to" grow a lot of vegetables to feed a big family and to be able to cook the food that they were used to.

Some gardeners informed us about the traditional use of each plant. A man of Iraqi origin in his forties showed his coriander bed and made a circulating gesture over his chest: "Coriander. It is good for the blood." Utility was sometimes of a more abstract character: One Polish woman in her sixties grew almost only flowers because they "made her relax". Among some gardeners, surplus produce could be sold, more or less informally, some just discretely handing out small plastic bags with

spices in exchange for money, while someone else had set up an proper booth with a roof, flags and a counter.

Karine Mannerfelt has drawn attention to a number of rare and exotic species from a Swedish point of view.¹¹ In the Malmö setting, we discerned in the immigrants' gardens some common species that are traditionally grown in Swedish kitchen gardens, such as potatoes, onions, beans, lettuce, rhubarb, celery, kale, parsley, red radish, black radish and tomatoes. Some species, though, have been introduced or reintroduced to Swedish gardens during the last few decades, such as squash, white radish, white-beet, garlic, mint and coriander. One informant gave proof of the changing variety of seeds that can be found in Swedish garden shops: "When we got here [to Sweden], it was hard to find seeds and plants. Nowadays, you can get anything everywhere" (Greek man, about 70 years old). Globalization, thus, is manifest in the assortment of market gardens. Other varieties are still hard to find, and informants testify to bringing them or getting them from relatives abroad, or letting some of the crop set seeds. Newer and definitely more exotic species like fenugreek; new forms of garden cress, rocket, aubergine, black-eyed beans and leek were also identified. Some species that are perceived as weeds in Sweden and normally not eaten, such as common sorrel, are grown.

We expected to find that the composition of species grown in each garden would be very different from one garden to the other. Some gardeners actually presented their combination of plants as culturally specific. A Greek man, about 70 years old, told us: "Arabs have their species, and we have ours. We grow things as we did in our own countries." But when interviewing his Arab allotment neighbours and observing their gardens, we were able to establish that they grew almost the same species all over the area, with some minor variations. Our impression is that plants seem to be important for identity construction in relation to an imagined "Other". In practice, there seems to be, for example, a "Mediterranean" kitchen garden with minor variations, and we observed that gardeners from East European countries grew plants that more resembled old traditional Swedish gardens with a variety of kale, peas and tubers.

To some informants, it was important to show us plants that had been brought or sent from their home country. A lady in her sixties from Macedonia, who spoke very little Swedish, demonstrated a 40-centimetre green sprout with leaves, gesticulating enthusiastically and telling us: "I brought a hazelnut from Macedonia. I crushed the

crust it a little and planted it and look, now it grows here”. This woman had also grown some grapevines that her daughter had brought to her from her hometown.



1. Gardeners in Persborg allotment gardens, Malmö

Photo: Ebba Lisberg Jensen

The enthusiasm showed the joy of constituting an unbroken biological connection to the place of origin. We immediately associated her action with a very significant event in the national epos of Swedish migration to Northern America in the nineteenth century by Vilhelm Moberg. His main character, Kristina, brings with her from Småland an Astrakhan apple kernel, and she plants it close to her new home in Minnesota. She lives there to see it grow and sprout, and when it finally bears fruit, she is ready to die:

Suddenly the mouth grew stiff, the lower jaw stopped in an attempted motion. The eyelids twitched and the whites became enlarged. Her breath was drawn out while the voice grew even weaker. “I recognise it... Our Astrakhans are ripe...”

Then there came only a soft sigh as she breathed out: “Our apples are ripe. I’m home...”

There was a spasm in her arms, then they lay still, and the hands’ hold on the fruit loosened. The big apple rolled slowly down the slope of the blanket and fell with a thud on the floor near the bed.¹²

Bringing seeds and seedlings is a common phenomenon. To bring well-known plants may enhance the feeling of “rooting” in a new environment – the opposite of the “uprooting” that a migration causes. It creates a feeling of being at home that seems to be a universal urge. One informant, a Palestinian man in his sixties who had lived in Sweden for twenty years, felt that what he perceived as climate change was reflected in his increasing sense of feeling at home: “It used to be hard to get plants to grow, but now everything grows here, it is warmer now. Climate is changing.”

Our world is increasingly globalizing. People move but maintain and establish personal relationships across the globe. One example of this was an Iraqi man in his forties, with his little daughter helping him and translating, who told us about his squash plants: “This is *American* squash. It is much bigger. I got it from a relative in Canada.” The allotment garden had also helped him to get in contact with an ethnic Swede, though he seemed not to talk Swedish at all: “I got the rose from my friend. He is a Swede, he owns the allotment garden right there. He said: ‘You are my friend, I will give you this plant.’”

Multiculturalism is a very concrete phenomenon in the allotment gardens. People stick to their traditions, species and varieties, but they also accept new variations of crops, exchange seeds with each other and live side by side.

CONTESTED BIODIVERSITY

Plants and the choice of plants are symbolically laden, showing that the gardener is open-minded, artistic, a fancy globetrotter, or traditional. There is no such thing as value-neutral planting.

Traditionally, gardening in European parks has been focused on landscaping and succeeding in growing exotic and beautiful sorts of trees, bushes and flowers. For instance, castle parks in the eighteenth century contained “Chinese parks” with bamboo and houses for oranges. Private gardeners have also taken a pride in collecting exotic flowers from other parts of the world and transforming their own little patches. This can be seen as early expressions of the globalization and biological diversity described above.

Today, many cities lack sufficient greenery. Foliage and lawns, besides offering beauty to the citizens, are also said to provide *ecological services* such as cleaning air and water, slowing water flows and floods, decreasing urban heating and cold winds, absorbing pollutions and noise, etc.¹³

A central trait in this ambition is to create biodiversity, enhancing living conditions for animals and plants in order to provide these services. Greenery is said to be an important factor when creating a *sustainable city*.

During the last decade, a number of national actors have launched campaigns to inform and stimulate planners to achieve this goal of sustainability. For instance, a publication by the Swedish Society for Nature Conservation and the Centre for Biological Diversity stresses the need to plant *domestic* species:

To favour biodiversity in choice of plants, one can *imitate nature* in the surrounding landscape, i.e. choose indigenous, wild species within their natural habitat and adapt the choice of place, biotope and succession.¹⁴

This is an example of how the concept of biodiversity denotes the natural, the original and the domestic, as discussed above. The statement shows a more conservationist discourse, where original nature is the ideal rather than refinement and exoticism.

But the times are changing and so are ideals. One example is that city gardeners in Malmö city centre say that the urban environment demands a completely new set of species:

The urban environment is barren. The soil is compacted and impoverished and there is less air and water in the ground. The circumstances are different from a hundred years ago, when many of these elm trees were planted. Today, we use many trees from exotic places. Today we also spread risks, by employing a variety of species and varieties.¹⁵

In this quotation, biodiversity seem to be a question of functionality and stability rather than an issue of aboriginality. Hence, the concept of biodiversity today also includes exotic species, which makes it even more complex. The old idea that the original, untouched biota is the most stable and resilient to change is thereby contested.

CONTESTED CULTURAL DIVERSITY

A parallel to the changing understanding of diversity in nature is found in the discourse of multiculturalism. Conservative xenophobic political actors maintain the idea that a balanced, harmonic society must be culturally and ethnically homogeneous. Foreigners are seen as anomalies, elements in the “wrong” environment, similar to the biological idea of “exots”. A lot of political energy is put into the rhetoric aiming to repatriate them – or, if this cannot be achieved, to assimilate them in Swedish society and culture. In some cases, the parallel between immigrants and plants is obvious: Immigrants are depicted as invasive species, ready to invade, spread uncontrolled and dominate Sweden:

Mass immigration, together with the high nativity among some immigrant groups and the absence of assimilation policies, means that Swedes within a few decades risk becoming a minority in their own country. This development will affect all aspects of societal life and transform our country beyond recognition.¹⁶

This way of describing people – as an invasive species with destructive capabilities – is obviously not politically correct. The old idea that it is birth, rather than citizenship, that constitutes “Swedishness”, associates people with something that is either “in its place”, or “out of place”, hence, an anomaly, a disorder, an invasive species. This idea, essentialism, describes national culture as inherent rather than socially constructed and fluid.

On the other hand, in the discourse of Swedish political establishment, cultural diversity is always held up as inherently good. Any problematizing or criticism of policies of multiculturalism is interpreted as unacceptable.¹⁷ Postmodern open-mindedness towards difference and the rejection of racism as a rule, nevertheless, does not apply to plants:

Giant hogweed is very competitive and forces out and displaces domestic plant species. The Swedish Environmental Protection Agency considers it to be a threat to biological diversity.¹⁸

An interesting feature here is that it is not the *Swedish flora* as such that is threatened, but *biodiversity* itself. One might think that one more species should increase biodiversity, but this is not the case. Instead, the concept of biodiversity is used in the sense of “original”. Biodiversity comes to mean “species in their places”.

We started out by drawing a parallel between the concept of biological and cultural diversity. There are many similarities, not least the critique against modernity's idea of creating uniformity and order. But there are also differences. Multiculturalism is generally accepted as something desirable and a condition for a sustainable society – except among more or less overtly racist political organizations. Among them, multiculturalism as such is a threat to what they think of as the original “order”, people in their “right places”. Biological diversity, analogous as it may seem, is much more complex. It may on one hand denote a variety of individuals, species and populations, but, on the other hand, it is often used as synonymous with original, untouched and indigenous nature.



2. “The African park”.

An experiment with the establishment of a savannah-like landscape on an overgrown pasture in Bunkeflostrand
Photo: Ebba Lisberg Jensen

Sometimes, when exotic species are put in new settings, as in parks or the gardens of the rich and wealthy, they may be associated with elegance and international influences with a high cultural status. One example is the palm trees that are put out every summer on the long beach walk in Trelleborg, giving the city an air of Cannes. They also alert strong

feelings of homesickness among the immigrants of Mediterranean and Middle Eastern origin that we have interviewed. But the palms are not planted; they grow in pots. If they were planted, and if it were warm enough for them to grow, they would probably provoke more debate. When immigrants bring with them and change the biological diversity in the allotment gardens, it may be seen as very positive by some, while others may find it a threatening manifestation of their difference and a threat to native culture and nature.

One way of enhancing biological and cultural diversity could be to establish “multicultural” gardens with exotic trees, bushes and plants. This has been done, for example, in York, to create social integration and sustainable development. This idea was presented to students during a lecture at Malmö University, but it turned out to be highly provocative. The basic argument among the students was that immigrants have to adapt to “our Swedish nature”. But the idea of “Swedish nature” in urban green areas is somehow obsolete. A book on famous trees in the parks of Malmö shows that almost every park tree is of exotic origin.¹⁹

When it comes to gardens, nature is physically a social construction – and has always been so. People, like flowers, do not “belong” in a particular place. Instead, it is a part of our biological history to move around and bring species with us. Sometimes new societies and new farming habits appear. The difference is that migration and exchange of plants is faster today than it has ever been before. But, eventually, differences may not be that visible anymore. Or, as one informant told us: “You have to grow with your garden”, meaning that it takes time, but don’t give up. Maybe this holds true for a multicultural society with biological diversity too.

NOTES

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